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ENVIRONMENTAL IMPACT REPORT AND ENVIRONMENTAL IMPACT STATEMENT

Syar Industries, Inc. Mining Use Permit Application, Reclamation Plan, and Section 404 Permit Application

SCH #91113040

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Prepared by

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Sacramento, California

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July 1993

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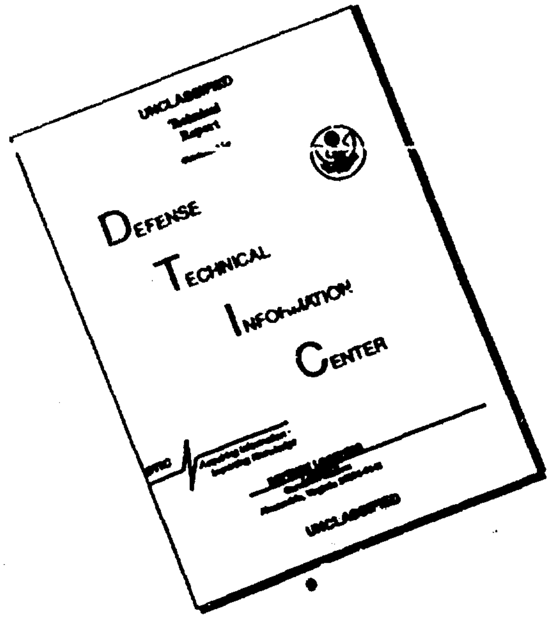

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DRAFT
ENVIRONMENTAL IMPACT REPORT AND ENVIRONMENTAL IMPACT STATEMENT

SYAR INDUSTRIES, INC.
MINING USE PERMIT APPLICATION, RECLAMATION PLAN, AND SECTION 404 PERMIT APPLICATION

Sonoma County, California

Federal Lead Agency:	U.S. Army Corps of Engineers San Francisco District Regulatory Branch 211 Main Street San Francisco, CA 94105-1905 Contact: Lars Forsman (415) 744-3322, Ext. 226
State Lead Agency:	California State Mining and Geology Board MS 0905/801 K Street Sacramento, CA 95814 Contact: Denise Jones (916) 445-6921
Local Lead Agency:	City of Healdsburg Corporation Yard P.O. Box 578 Healdsburg, CA 95448 Contact: Jerry Haag (707) 431-3346

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ABSTRACT:

Syar Industries has prepared reclamation plans for six aggregate mining sites on the Russian River, between river mile 25 (as measured from the mouth of the river at Jenner, California), north of Wohler Bridge, and river mile 34, just east of the City of Healdsburg in Sonoma County. Five of these six sites are vested. Of these, four would be subject to bar skimming and channel excavation, and the fifth, the Doyle Site, to floodplain pit mining. A sixth site is in the City of Healdsburg, and is not vested. A mining use permit has been submitted to the City for this site. At the Healdsburg site, bar skimming, channel excavation and construction of five spurs, to prevent bluff erosion, are proposed. A Section 404 permit application has been submitted to the Army Corps of Engineers for fill activities associated with mining and reclamation for the entire project. Anticipated impacts include river bed degradation, changes to fisheries, decreased water quality, loss of riparian vegetation, periodic impediments to recreation, and increased noise.

The alternatives examined in this EIR/EIS are: no project; bar skimming only, bar skimming on two sites without exceeding the rate of replenishment; and, mining in the terrace (no in-channel mining).

Comments on the Draft EIR/EIS must be received by September 28, 1993.

Prepared by

EIP Associates
Sacramento, California

July 1993

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1. INTRODUCTION

1. INTRODUCTION

Syar Industries Inc. (project applicant) has prepared reclamation plans for proposed aggregate mining operations in and adjacent to the Russian River in Sonoma County. These operations would occur at six separate sites along a nine-mile reach of the river beginning approximately at river mile 25, north of Wohler Bridge and ending approximately at river mile 34 just east of Healdsburg. These sites are referred to as Doyle, South Levee Haul Road, Middle Reach, North Levee, Healdsburg Bendway, and Riverbend. Operations and reclamation at these sites would be conducted in phases over a period of several years. Transport of excavated materials from the South Levee, Middle Reach, and North Levee sites would occur along a private haul road adjacent to the river and would involve the use of temporary roadway overcrossings of Dry Creek (near the confluence of Dry Creek and the Russian River) and the Russian River (just north of Highway 101).

The project applicant maintains "vested rights" to extract aggregate at five of the six Russian River sites, thus allowing the proponent, by law, to proceed with their operations at these sites without the need of a new permit from the County. No vested rights exist for the Healdsburg Bendway site, which is within the jurisdiction of the City of Healdsburg. Therefore, a City conditional use permit is required prior to mining at this site.

Pursuant to the 1975 California Surface Mining and Reclamation Act (SMARA), as amended by Assembly Bill 747 (1987), surface mining operations in existence prior to, and continuing after, January 1, 1976 were not required to obtain permits to mine. These "vested rights" operations, however, were required to have a reclamation plan submitted to their lead agency by March 31, 1988. Lead agencies, in turn, were required to have the reclamation plans for vested rights operations reviewed and approved or denied by July 1, 1990.

SMARA Section 2770 provides a process by which a mining operator can appeal to the State Mining and Reclamation Board, under certain conditions, if a reclamation plan for a vested operation was filed on time, but not approved or denied by the appropriate lead agency by July 1, 1990. Additionally, Section 2770 provides that all new surface mining operations have an approved reclamation plan prior to commencement of work. Pursuant to Section 2770, the project applicant prepared reclamation plans for each of the proposed mining sites mentioned above, and has submitted an appeal on those plans to the State Board. The State Board has in turn directed that an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) be prepared on those plans, because it has anticipated that significant environmental affects could occur.

This Draft EIR/EIS has been prepared in conformance with the requirements of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). It identifies the environmental effects of mining and reclamation plans for both the vested sites and the nonvested site (Healdsburg Bendway). In addition, the cumulative impacts of the Dry Creek and Russian River stream crossings are evaluated in relation to the proposed project and project alternatives.

Both NEPA (40 CFR §1502.14) and CEQA (Guidelines §15126(d)) require analysis of alternatives to the proposed project. Alternatives are designed to eliminate some or all of the potentially adverse effects of the project. Pursuant to NEPA, this EIR/EIS treats all alternatives equally with respect to environmental analysis. A total of five alternatives are evaluated, including the proposed project and a "no project" alternative.

Three separate entities are acting as co-lead agencies for this EIR/EIS. For the five vested sites under appeal to the State, the California State Mining and Geology Board is the Lead Agency during the CEQA process and will approve or deny the reclamation plans for the vested sites. The County of Sonoma will be responsible for implementation of the approved reclamation plans and mitigation measures for these five sites, and is a Responsible Agency. The City of Healdsburg is the Lead Agency for the nonvested site (Healdsburg Bendway) during the CEQA process and is responsible for approval of both a mining permit and the reclamation plan through a use permit. Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (COE) regulates the placement of dredged or fill material in the waters of the United States. Within the project area, this jurisdiction extends to the ordinary high water level of the Russian River and to adjacent wetlands. Therefore, the COE has regulatory authority over several aspects of the proposed mining and reclamation activities, such as the construction of berms, stockpiles, channel crossings, and bank protection within jurisdictional areas. Consequently, the U.S. Army Corps of Engineers will act as the Federal Lead Agency for the six sites and will oversee project compliance with NEPA. There are also two Trustee Agencies, the State Lands Commission and the California Department of Fish and Game, involved in the process.

Concurrent with the writing of this EIR/EIS, the County of Sonoma has been preparing amendments to its Aggregate Resources Management (ARM) Plan and an EIR on those changes to the ARM Plan. Although the EIR/EIS authors are aware of possible revisions to the ARM Plan and accompanying environmental analysis, this EIR/EIS has been prepared as a separate document. Since the changes to the ARM Plan are still only proposals, it is the 1980 ARM Plan that is referenced in this EIR/EIS.

As provided in the CEQA Guidelines (§15021(a)) and NEPA (40 CFR §1500.2(f)), public agencies are charged with the duty to avoid or minimize environmental damage where feasible. In discharging this duty, the public agency has an obligation to balance a variety of public objectives, including economic, environmental, and social issues. The EIR/EIS is basically an informational document which informs public agency decision makers and the general public of the environmental effects of a proposed project. An EIR/EIS must identify possible means to minimize the effects and describe reasonable alternatives to the project. The lead agencies are required to consider the information in the EIR/EIS along with any other available information

in making its decision. The basic informational requirements for an EIR/EIS include discussions of the purpose and need of the project, environmental setting, environmental effects (direct, indirect and cumulative) and mitigation.

Prior to beginning the environmental analysis for this EIR/EIS, a Notice of Preparation/Intent (NOP/NOI) was distributed. The purpose of the NOP/NOI is to inform the public that an EIR/EIS is being prepared, and to solicit suggestions of issues that should be addressed in the environmental analysis. A copy of the NOP/NOI can be found in Appendix A. Responses to the NOP/NOI make up Appendix B.

Pursuant to CEQA and NEPA, this Draft EIR/EIS was released on July 30, 1993 for a 60-day comment period ending September 28, 1993. Any comments on the Draft EIR/EIS should be addressed to:

Lars Forsman
U.S. Army Corps of Engineers
San Francisco District,
Regulatory Branch
211 Main Street
San Francisco, CA 94105-1905

Denise Jones
MS 09-05
State Mining and Geology Board
801 K Street
Sacramento, CA 95814-3528

A public hearing will be held during the public review period. The time and place of this meeting will be publicly noticed. Responses to all comments received at the public hearing or in writing will be included in the Final EIR/EIS. Upon completion of the Final EIR/EIS, each lead agency will consider certification/adoption of the EIR/EIS and approval of the project.

HOW TO USE THIS REPORT

This report includes five principal parts: Summary; Description of the Project and Alternatives; Environmental Analysis (Setting, Impacts, and Mitigation Measures); Other Considerations; and Appendices.

The **Summary** presents an overview of the project and alternatives, controversial issues and the results and conclusions of the environmental evaluation. Existing physical, biological and socioeconomic conditions of the project area are briefly described. The Summary provides a table of all impacts and available mitigation measures identified in the Draft EIR/EIS for use by the Lead Agencies in reviewing the alternatives and establishing conditions for project approval. A distinct section summarizing the environmental analysis for the Healdsburg Bendway site is included.

The **Description of the Proposed Project and Alternatives** includes a discussion of the project site locations, proposed mining and reclamation plans, and descriptions of each of the alternatives. In addition, the purpose of and need for the project are presented, as are project objectives and required approvals.

The **Environmental Setting, Impacts and Mitigation Measures** chapter includes a topic-by-topic analysis of impacts that would or could result from implementation of the alternatives. The results of field visits, data collection and review, and agency contacts are presented in the text.

Other Considerations includes a discussion of issues required by CEQA and NEPA; unavoidable adverse impacts; growth inducement; and cumulative analysis.

The **Appendices** contain a number of additional reference items which were used in the preparation of this report. The Appendices are available from the State Mining and Geology Board, and at the Santa Rosa and Healdsburg branch libraries.

A **Glossary** of mining and reclamation terms is provided as Chapter 6. In addition, a list of preparers, public involvement section and bibliography are provided.

2. SUMMARY

2. SUMMARY

INTRODUCTION

The following discussion summarizes the environmental setting and impacts evaluated for the five alternatives presented in this Draft EIR/EIS. Table 2-1 presents a comprehensive list of impacts, levels of significance and mitigation measures. In addition, a summary of impacts specifically associated with Site 5, the Healdsburg Bendway, is included. A complete project description can be found in Chapter 3. For a full discussion of existing conditions and anticipated impacts, please refer to Chapter 4.

PURPOSE AND NEED FOR THE PROPOSED PROJECT

The purpose of the proposed project is to extract sand and gravel in the vicinity of the existing Syar processing plant and reclaim the project sites after mining. Because the expense of aggregate is largely determined by the cost of transportation; a local source is generally considered essential to keeping aggregate affordable. The project would provide an affordable source of high quality aggregate for the construction of roads, canals, dams, homes and commercial structures. In addition, the project would enable the operator to generate a reasonable profit.

DESCRIPTION OF THE PROJECT AND ALTERNATIVES

Syar Industries Inc. has prepared reclamation plans for proposed aggregate mining operations in and adjacent to the Russian River in Sonoma County, California as required by the California Surface Mining and Reclamation Act (SMARA). The project area is located between river mile (RM) 25 (as measured from the mouth of the river at Jenner), north of Wohler Bridge, and RM 34, just east of Healdsburg, and includes the following sites:

1. Doyle
2. South Levee Haul Road
3. Middle Reach
4. North Levee
5. Healdsburg Bendway
6. Riverbend

These sites are shown in Figure 2-1 and on the aerial photograph found in the map pocket at the back of this document. Syar Industries acquired its vested rights in the greater Middle Reach

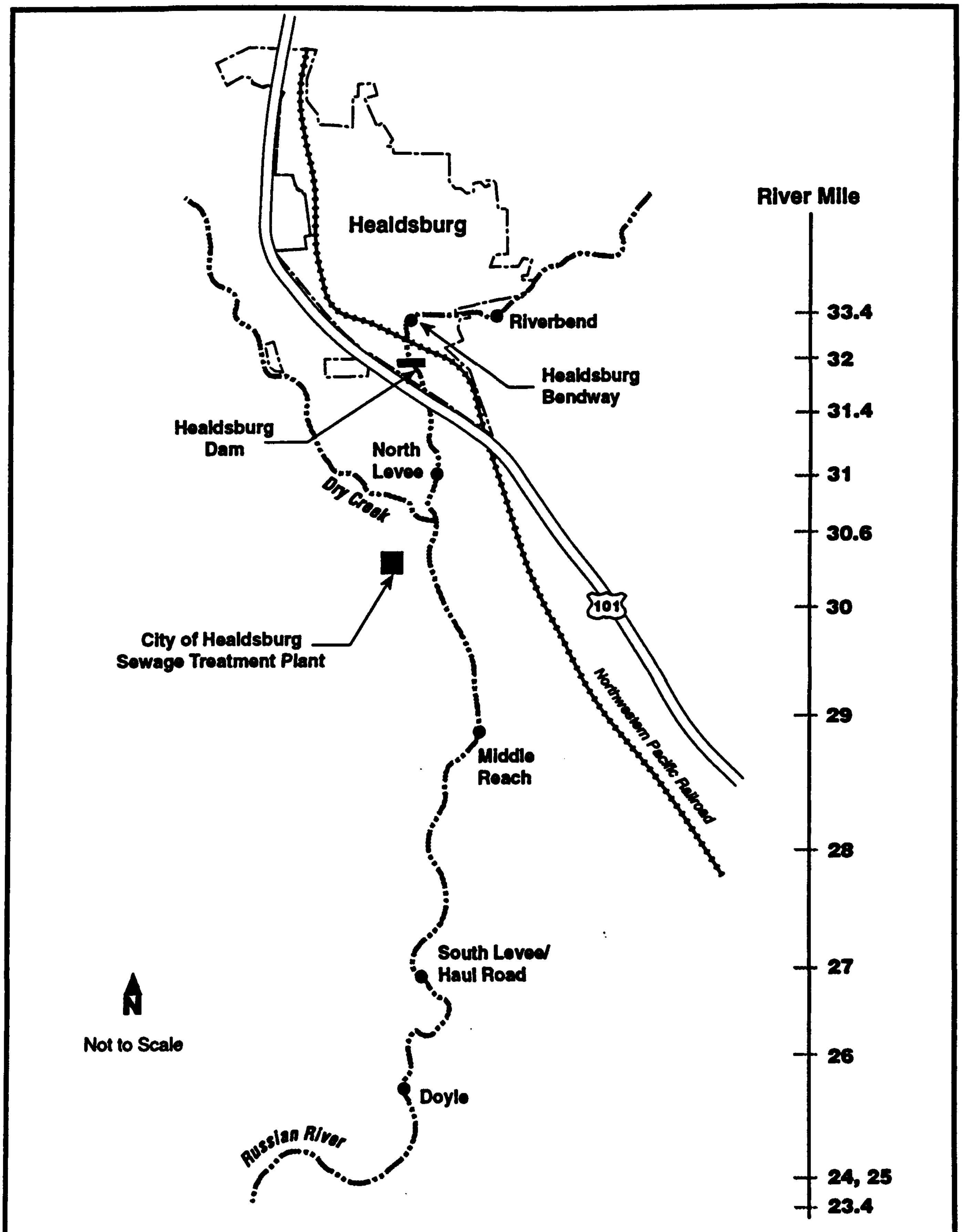

Figure 2-1
Proposed Mining and Reclamations

area in connection with the purchase of the Basalt Rock Company in 1988. Basalt had acquired vested rights by virtue of mining activities which predated the effective date of SMARA. These vested rights are summarized in Table 3-1. SMARA recognized that many lawful mining activities had been conducted prior to 1976 (when SMARA became effective) and that, as a result, the right to carry on these activities had become "vested". Vested rights are a substitute for a mining permit under SMARA and local ordinances implementing SMARA (see Public Resources Code Section 2776). Mining to the extent of the vested rights is therefore a permitted activity under SMARA not subject to discretionary review by the County. A vested rights reclamation plan contains reclamation measures for this permitted mining. Vested rights are property rights under California law. Therefore, the holder of vested rights cannot be denied the right to mine either directly or indirectly through reclamation plan requirements, without resulting in a "taking" of property requiring compensation by the government. It should be noted that Syar's vested rights pertain to Sonoma County; state and federal permits, where applicable, are still required.

This Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) examines the impacts associated with the proposed mining and reclamation plans and several alternatives. The Draft EIR/EIS has been prepared under the California Environmental Quality Act (CEQA) and the National Environmental Protection Act (NEPA), with the US Army Corps of Engineers, the State Board of Mining and Geology, and the City of Healdsburg acting as lead agencies. The project and alternatives are given equal levels of evaluation throughout the EIR/EIS. The alternatives are:

A-1 No Project Alternative: This alternative assumes that no mining or reclamation activities would occur in the project area.

A-2 Proposed Project: This alternative is consistent with the reclamation plans submitted by Syar Industries. Gravel bar skimming would occur at every site except Doyle, which would be limited to terrace mining. At the Middle Reach site, the river would be diverted temporarily to allow excavation of the channel and creation of a system of pools and riffles. Stream crossings would be constructed during the mining season to allow truck access to gravel bars. The number of crossing would vary each year depending on which sites are active during that year. Five spurs would be built at the Healdsburg Bendway to minimize erosion.

A-3 Gravel Bar Skimming Alternative: Under this alternative, gravel bar skimming would be allowed to one foot above low summer flow, consistent with the 1980 ARM Plan. Terrace mining would occur at the Doyle site, but no deep-channel excavation would be allowed. Stream crossings to gravel bars would be constructed. Spurs would not be constructed.

A-4 Limited Bar Skimming Alternative: This alternative is similar to Alternative 3, except that, initially, only bars at the Middle Reach and South Levee Haul Road sites would be mined and reclaimed. Extraction rates for the instream sites would be limited to the rate of replenishment as established by current estimates. This

rate may be modified as additional information becomes available through a proposed monitoring plan. Terrace mining would occur at the Doyle site.

A-5 Floodplain Skimming/Streamway Development Alternative: Under this alternative, mining would occur on approximately 45 acres of floodplain terrace adjacent to the river at the Middle Reach site. Excavation of the 45-acre site would occur exclusively above the water table. No in-channel extraction or mining at the Doyle site would take place. Spurs would not be built.

SUMMARY OF AFFECTED ENVIRONMENT

This section summarizes the physical, biological and socioeconomic environment of the project site and vicinity. More detailed descriptions of existing conditions are found in the setting section of each issue area in Chapter 4.

The project area lies within a relatively flat valley ranging in width from approximately three-quarters of a mile at the southern end to two miles at Healdsburg. The Russian River in this area has been mined for aggregate for over fifty years. The lands adjacent to the project site are predominately agricultural; however, several terrace mining pits have been developed adjacent to the river channel in the floodplain between Highway 101 and Wohler Bridge. Agricultural use in the area is predominantly vineyards. Narrow stretches of riparian vegetation line the river, which is heavily used for recreational activities, particularly swimming, fishing and canoeing.

Geology and Soils (See Section 4.2)

The project site is located in the Russian River Basin in the northern portion of the Coast Ranges Geomorphic Province, which is characterized by northwest-southeast trending mountain ranges and alluvial valleys. Mining operations within the project site consist of terrace and bar skimming extraction of gravels deposited during the Quaternary Period over the last 3 million years.

In general, the river basin is underlain by the Franciscan formation which was deposited when the region was covered by oceans during the Jurassic-Cretaceous Period. This is a mechanically weak and clay-rich formation consisting of sandstone, shale, greenstone, cherts and serpentine. This is considered the basement rock of the Coast Ranges.

Other formations found in the Russian River Basin include the Merced formation (Pliocene sandstone), Sonoma Volcanics (Pliocene basalts and ash), the Glen Ellen formation (Pliocene/ Pleistocene sedimentary and volcanics), and river terrace and alluvial fan deposits of the Pleistocene Epoch. The terrace and alluvial fan deposits are coarse grained gravels and sands near the river channel and valley centers, and finer silts and sands at the valley edges.

The San Andreas fault system is located on the western edge of Sonoma County and is approximately 30 miles southwest of the project site. In addition, the Healdsburg-Rodgers Creek

and Maacama-Talmage faults are located within 10 miles of the project site. These three faults are historically active and have exhibited varying levels of rupture in the last 80 years.

There is great diversity of soil types throughout Sonoma County, and several different soils are found within the project site vicinity.

The predominant association of soils in the vicinity of the project site is known as the Yolo-Cortina-Pleasanton Association. Generally, these soils are located on floodplains, alluvial fans, and low terraces in major and minor streams and drainages. The most common occurrence of this soil associations is in the Russian River and Dry Creek valleys.

Hydrology and Channel Dynamics (See Section 4.3)

The Russian River is a major California north coast river draining a 1,485 mi^2 basin, extending from the inland Ukiah Valley in central Mendocino County on the north and the Santa Rosa Valley to the south, into the Pacific Ocean at Jenner in Sonoma County. Dry Creek, a primary tributary entering the Russian River below Healdsburg at RM 30, drains 127 square miles and also flows southward through a 10-mile long northwest trending alluvial valley. The middle reach of the Russian River consists of a generally straight channel aligned in the center of a broad floodplain and valley floor. The floodplain is about 2 miles wide at the upstream end just below Healdsburg, narrowing to 1,500 feet at the Wohler constriction at RM 24.

In the Ukiah Valley, the Russian River flows in a relatively straight channel lined with dense riparian vegetation. Gravel extraction (instream and floodplain) occurs within the Russian River and on the floodplain of the Ukiah Valley. The instream extraction rate was approximately 100,000 tons in 1988, an annual rate thought to be typical for the 1980s. Since 1988, the instream operations have been reduced with greater emphasis on quarry extraction. Instream extraction rates dropped to 45,000 to 60,000 tons per year for the 1990 to 1992 period.

The Healdsburg Dam divides the project reach into two distinct geomorphic reaches, with differing geomorphic forms and processes. Below the Healdsburg Dam, the river is influenced by ponding during flood events caused by the Wohler constriction. This hydraulic backwater area is reflected by the corresponding flat channel bed topography in this area. Sediments on gravel bars and in the low flow channel are generally coarser at the upstream end of the study reach, near Highway 101, becoming finer downstream to the Wohler constriction, ranging from sand to silt. However, downstream of the constriction, after the river passes through a 90 degree bend to the west, bed sediments coarsen to small cobble sizes. Between this bend and the Wohler Bridge bed sediments become dominated once again by gravel and coarse sand sizes. Riffles below Highway 101 have maximum sediment grain sizes in the cobble range with minimum grain sizes in the range of coarse gravel. Some of the riffles may be "armored" where a surface layer of coarse sediment cannot be moved by floods and the riffles are fixed against erosion. Gravel bars are "paved", composed of coarser bed material overlying finer sediments; however, they are mobilized by floods. Pools contain a range of sediment sizes from fine sand to coarse gravel. Well-vegetated bars have deep deposits of fine sands and silt; the result of the vegetation increasing hydraulic roughness, slowing flow velocities and inducing deposition of suspended sediments.

In the reach between the Healdsburg Dam and the Wohler constriction and backwater, the river flows with a positive hydraulic gradient. This area includes the North Levee and Middle Reach sites. The channel has typical dimensions ranging between 800 to 1,500 feet wide and 25 to 50 feet deep and contains densely vegetated low floodplain areas. Alternating gravel bars range from 600 to over 2500 feet long and 80 to 350 feet wide. A 60 to 150-foot wide low flow channel meanders between gravel bars. The low flow channel has a pool, riffle, run morphology with major gravel riffles occurring at transitions between alternating gravel bars. Low terraces and gravel bars within the channel and channel banks are the few areas that support dense, mature riparian vegetation. The channel banks were very stable in the 1980s (only 3 acres of bank erosion reported between 1981 and 1986 [Simons and Li, 1991]). However, instream extraction in the 1980s probably reduced erosion by suppressing lateral channel migration. The channel has the capacity to accommodate 10-year events before flows move onto the higher floodplain areas of the valley floor. The 100-year floodplain covers most of the Valley floor from Healdsburg to the Wohler constriction at RM 24.5.

The gravel bars upstream of Healdsburg Dam are without woody riparian vegetation, a consequence of being prone to frequent scouring and occasional gravel extraction. These bars migrate downstream during sediment transport. The gravel bars downstream of Healdsburg Dam are generally fixed, longitudinally and do not migrate.

Geomorphic trends include: fine sediment aggradation and riparian vegetation colonization of gravel bars; lateral bank erosion due to point bar formation, and lateral channel migration to establish greater active channel widths and greater channel sinuosity.

Point bar aggradation and channel migration can be suppressed temporarily by bar skimming. Skimming the point bar restores the channel flow area, and reduces erosional forces on the outside bank, slowing the process of meander formation. Bar skimming over the past 15 years has probably suppressed the natural geomorphic trends described above. Recent cessation of skimming has allowed the river to evolve and adjust to restore these natural trends it lost over the past 50+ years.

The bridges crossing over the project site are the Highway 101 Bridge at RM 31 (built in 1958), and the Healdsburg (built in 1920) and the Southern Pacific Railroad Bridges (built prior to 1945) located just upstream of the Healdsburg Dam. Other bridges that may be affected by the project include the West Side Road bridge over Dry Creek (built in the 1920s), and others downstream of the project site, including the Wohler Road Bridge (built in 1931), the Hacienda Bridge at Guerneville, and the Bohemian Highway Bridge at Monte Rio.

The Healdsburg Dam forms an artificial control on the channel bed just downstream of the Healdsburg and Southern Pacific Railroad Bridges. The present dam was built in 1952 for the primary purpose of holding flashboards to create a deep swimming pool in the summer months.

<u>Surface Water Quality</u> (See Section 4.4)

Turbidity has been a persistent problem in the Russian River. Ritter and Brown found that turbidity was generally related to stream borne sediment discharge and diversion of turbid water

from the Eel River Basin. Instream gravel mining is a possible cause of the turbidity measured at the Guerneville gage, and reported in the study. However, this must be placed in perspective, since the intensity of instream mining was substantially greater during 1964-68, when the Ritter and Brown study was conducted.

<u>Groundwater</u> (See Section 4.5)

Groundwater supplies about 60 percent of the total water demand in the areas near the study reach of the Russian River and Dry Creek. The City of Healdsburg, City of Windsor, and the Sonoma County Water Agency rely on groundwater from the area's alluvial aquifer for municipal supply. The area's aquifer provides water for domestic and agricultural as well as municipal uses. Besides the municipal supply wells, many wells are found on individual properties. Other areas rely on conjunctive use of surface and groundwater supplies.

The alluvial aquifer is unconfined within alluvial deposits underlying the Russian River floodplain and terraces. The saturated aquifer thickness measured in municipal supply wells ranges between 31 feet at the Fitch Mountain Well Field to 47 feet at the Windsor wells. The Russian River channel lies 30 to 50 feet above the base of the aquifer. Most wells fully penetrate the aquifer to its base, the boundary of the alluvial sediments with the underlying ubiquitous "blue clay". The top of the groundwater table coincides in elevation with the water level in the low flow channel. All municipal wells in the Middle Reach are hydraulically connected to surface water in the river and Dry Creek.

Groundwater movement in the valley is generally in a north to south direction longitudinal to the valley axis. The Dry Creek Valley alluvial aquifer enters just north of the Grace Ranch Pit (see Figure 5-2) and merges with the aquifer along the west side of the river. The aquifer on the east side of the valley is bounded by older alluvial deposits and has several large, gravel extraction pits dug below the groundwater table to the base of the aquifer The pits are either active extraction pits, abandoned, or being used to dispose of waste silts.

The valley groundwater table is sensitive to the elevation of surface water in the river, and therefore to the elevation of the channel bed.

The California Department of Water Resources found that groundwater in the area is moderately hard to hard (dissolved $CaCO_3$), but generally suitable for all uses. Surface water was moderately hard and met water quality criteria for all general uses.

The City of Healdsburg's Fitch Mountain Well Field serves the southern part of the City of Healdsburg, with a present maximum daily demand of 2.22 million gallons per day (mgd), which is projected to be 2.64 mgd at full build out after 2005. The Fitch Mountain wells are located just north of the river channel adjacent to the proposed Healdsburg Bendway reclamation site. It has been shown that these wells are hydraulically connected to the river; therefore, they are very sensitive to any changes in surface elevation of the river. The City of Healdsburg's Gauntlett Well Field, located in upper Digger Bend, is not hydraulically connected to the Russian River in the project reach because bedrock separates the aquifer in Digger Bend from the study reach aquifer. The Gauntlett Well Field serves the northern area of the City of Healdsburg.

The City of Healdsburg's Fitch Mountain and Dry Creek well fields have experienced turbidity problems. Turbidity consists of fine mineral and organic particles that may be dislodged from the aquifer material near the well screen or slots, or from a source of turbid surface water that enters the pumped well. Turbidity can cause problems in water clarity and taste, and some of the suspended mineral constituents can adsorb iron and/or manganese. Brelje & Race (1992) state that the quality of water (specifically turbidity) taken from the municipal well fields is the greatest concern and challenge for the City of Healdsburg to maintain present and develop future water supplies. The Windsor wells have recently experienced problems with air entrainment in their wells. This has necessitated a reduction in pump rates in Well #7 and loss of production.

<u>Fish Resources</u> (See Section 4.6)

At least 46 fish species have been identified in the Russian River and its estuary.[1] These species include native and introduced anadromous, estuarine and resident fishes. Twenty-seven species are native to the system with only the Russian River tule perch, *Hysterocarpus traskii pomo*, being endemic solely to this drainage.[2]

Anadromous fish are those species that migrate to sea but return to freshwater for spawning. The anadromous salmonids known to the system include steelhead trout and chinook, coho and pink salmon. Additional native anadromous species include the Pacific and river lampreys, the white and green sturgeon, and threespine stickleback. Introduced anadromous species include the American shad and the striped bass.

The resident species of the Russian River system include the California brook lamprey, western sucker, three to five species of minnows, the Russian River tule perch, three species of sculpins, and possibly Sacramento perch. The Sacramento perch and two species of minnows may have been introduced into the system from the Central Valley.[3] Additional introduced resident species include four species of catfish, mosquitofishes, two species of crappies, three species of sunfishes, and two species of bass.

Generally, the Russian River system is dominated by nongame fish, specifically suckers and minnows. Historically, resident trout populations have been low in the river and presently, trout populations occur only in headwater areas of tributary streams. Anadromous salmonids (trout and salmon) do not spawn in the Russian River (except when access to tributary streams is blocked), but use the river as a pathway to reach spawning areas in its tributaries.[4]

The Russian River tule perch is of special concern because of its current status as a federal Category 2 candidate species for listing pursuant to the Endangered Species Act. The California freshwater shrimp, which is included on both the state and federal endangered species lists, is known to occur in several tributaries of the Russian River[5], but does not occur within the study reach.

<u>Terrestrial Biological Resources</u> (See Section 4.7)

Much of the riparian vegetation along the Russian River was cleared for logging, mining, urbanization, and in particular, agriculture between the mid-1800s and the mid-1900s. Presently, only a thin and discontinuous strip of the former riparian forest band remains.

Aerial photography shows that the river channel within the study area at one time had a significantly more meandering pattern. The photographs also show that large patches of riparian forest existed between the vineyards, extending in some places up to at least a mile from the riverbank.

The habitats present within the study area include valley-foothill riparian, unvegetated gravel bars, pond (lacustrine), vineyard, and urban. Valley foothill riparian habitat on the proposed project site is represented within the river channel by three general plant communities: riparian herb-scrub, willow-cottonwood woodland, and riparian forest. These communities reflect the successional stage, or maturity of valley-foothill riparian habitat within the study area with herb-shrub habitat representing the early successional stage and riparian forest the mature stage. Typically, the areas of early successional habitat are prone to frequent flooding or human disturbance while the later successional stages are less prone to disturbance.

In general, the wildlife value of the valley-foothill riparian habitat in the vicinity of the study area is very high. Within Russian River riparian habitats there are 270 species of plants, as well as 108 species of birds, 20 species of mammals, eight species of amphibians and reptiles, and 15 species of butterflies.[6]

The herb-scrub plant community provides breeding and foraging habitat for amphibians, reptiles, waterfowl, small shore birds, and small mammals. Blacktail mule deer browse on the vegetation. Mourning doves, California quail and songbirds nest in the dense thickets. These dense thickets are also potential habitat for yellow warbler and yellow-breasted chat, both DFG species of special concern.

The smaller bird, mammal, and reptile species provide a prey base for hawks, owls and predatory mammals such as raccoon, grey fox, and ringtail cat, which are likely to den and breed in the adjacent woodland or forest habitats.[7] River otters forage in ponds, backwaters, and terrestrial vegetation within this community and den in snags, hollow logs, thickets and burrows.[8]

The willow-cottonwood woodland is dominated by Fremont cottonwood, red willow, yellow willow, arroyo willow, and sandbar willow and provides habitat for breeding, foraging, migration, escape and thermal cover for an abundance of wildlife species, including many of those that also use riparian herb-scrub.

The riparian forest is considered a climax stage of succession in the valley-foothill riparian habitat. This plant community exists on alluvial terraces, at a farther distance from the river than the willow-cottonwood woodland. Riparian forests are considered among the most productive wildlife habitats in California. The acreage of this plant community has decreased dramatically in California since the turn of the century.[9] Besides species that may use other portions of the

riparian habitat, the tall trees in this plant community are an important source nesting and perching sites for a variety of raptor (bird of prey) species and rookery (communal nesting) sites for herons and egrets.

The amount of riparian habitat within the study area is highly variable from one river mile to the next. Near the city of Healdsburg, for example, the riparian corridor is narrow, supporting only 40 to 68 acres of riparian habitat per river mile (at RMs 30-33) . In comparison, south of Dry Creek, at RMs 26, 27, and 29, over 100 acres is supported per mile[10].

Gravel bars may lack vegetation because they have been scoured by floodwaters, "skimmed" to extract gravel, or because the bar is newly formed. While these bars do not provide cover, they do provide shallow access to the river channel (as opposed to a steep bank) for mammals, waterfowl and other wading birds. In certain cases, these bars are small islands, which waterfowl can use as a refuge, since mammalian predators lack easy access to the same bars.[11] Unvegetated gravel bars also provide habitat for reptiles to bask and raise their body temperature.

Gravel bars provide a substrate for riparian vegetation to colonize. Depending on the development of the bar, more mature stages of riparian vegetation may become established. Gravel bars, particularly those not stabilized by vegetation, are also a source of aggregate for the creation and growth of gravel bars downstream from the study area.

The open water within the gravel pits provides foraging habitat on the site for a number of species of birds, including cormorants, kingfishers, wintering waterfowl and possibly osprey, along with other species. The quality of this habitat varies with the existence and size of fish populations, disturbance from dredging or other mining activity, and water quality affecting the aquatic food chains. At present, little freshwater emergent vegetation has established itself in the gravel pits. This lack of cover limits the usefulness of this habitat for some wildlife species. In addition, the steep sides of many of the pits make them fairly inaccessible to mammals.

The project site and vicinity provide habitat suitable for a number of special status animal species, including amphibians and raptors. Suitable habitat exists, or could exist, onsite for the Foothill yellow-legged frog, the Red-legged frog, the northwestern pond turtle, great blue heron rookeries, great egret rookeries, yellow warblers, the black-shouldered kite, the bald eagle, the yellow-breasted chat and the osprey. Of these, black-shouldered kites and osprey have been observed on the project site, and yellow warblers and yellow-breasted chats have been noted in the project vicinity.

Although there are a relatively large number of special status plant species found in Sonoma County, the vast majority are found in vernal pools, freshwater marshes and bogs, coastal scrub, chaparral, and upland forest; habitats that are not common on the project site.

There is one species of grass, *Sonoma alopecurus* that has the potential to exist within the project area. This grass is on the California Native Plant Society list 1B and is a Federal category 2 candidate for listing as threatened or endangered. *Sonoma alopecurus* is associated with riparian scrub habitat as well as marsh habitat.[12] This species was not observed during the comprehensive floristic survey conducted for the 1981 Aggregate Resources Management Plan.

Changes to the species composition may have occurred over the ten year interim; therefore, it can not be stated with certainty that the species is absent from the project site.

<u>Land Use</u> (See Section 4.8)

Five of the proposed mining/reclamation sites are in unincorporated Sonoma County; one, the Healdsburg Bendway, is in the City of Healdsburg. The predominant land use found adjacent to the project sites in the County is intensive agriculture, particularly below the Highway 101 Bridge. Those areas in the county are zoned LIA (Land Intensive Agriculture). The County also has a park just south of the SPRR bridge. Since the five county sites are vested, they are not subject to County permits for mining operations. However, under SMARA and the County's Mining and Reclamation Ordinance 3437, reclamation plans must be approved for all sites.

Within the City of Healdsburg, adjacent uses include residential, park and industrial. The area occupied by the Syar processing plant is zoned Heavy Industrial. The Healdsburg Bendway site is within the City limits and, because it is not vested, it is subject to both a use permit and approval of a reclamation plan. Healdsburg's Mining and Reclamation Ordinance 788 governs aggregate operations within the City.

<u>Visual Quality</u> (See Section 4.9)

The Russian River meanders through vineyards, orchards, riparian woodlands, and, in some areas, urban and rural residential lands. The river itself is a dominant scenic feature for residents and visitors. Views in the vicinity of the Doyle, South Levee and Middle Reach sites are characterized by riparian vegetation and gravel bars, broad agricultural panoramas and, in the distance, hills. The gravel bars and vegetation of the North Levee, Healdsburg Bendway and Riverbend sites are easily seen from roadways, residences and recreational areas. In addition, the river is used by canoeists and hikers.

The greatest number of people viewing the project sites would be in the Healdsburg area. Highway 101 crosses the river at Healdsburg, there is a mobile home park on the bluff overlooking the Healdsburg Bendway, and residential developments along the Riverbend site. Healdsburg Veterans Memorial Beach Park is just south of the SPRR bridge, while a smaller park is north of the bridge on the west side of the river. During the summer, flashboards are placed in the Healdsburg Dam, creating a deep backwater and swimming area from the dam to the Riverbend site.

<u>Recreation</u> (See Section 4.10)

The Russian River is used heavily throughout its length for a variety of water-related recreational activities, ranging from passive uses, such as sunbathing, to more active pursuits, such as swimming, sport fishing and recreational boating. The Russian River is host to a variety of sport fish including smallmouth bass, bluegill, catfish, carp, Sacramento squawfish, steelhead, and silver salmon.

Recreational uses in the project area are limited by a general lack of public access to the river banks. Sections of the river south of Healdsburg Veterans Memorial Park ar virtually inaccessible without trespassing on private land.

In addition to fishing, the riparian area offers ample opportunity for birdwatching, wildlife observation, photography, hiking and swimming.

Improved facilities are offered at the County-operated Healdsburg Veterans Memorial Park, located just off of Healdsburg Avenue on the east bank of the river. The park is a full-service public facility, providing paved parking for approximately 140 vehicles, outdoor showers for rinsing, restrooms, water fountains, a playground facility, sand volleyball court, beach area, grassy areas, shaded areas, restricted swimming area, a diving platform, barbecues, picnic benches and lifeguards. The park's swimming area is located immediately upstream from a seasonal dam which restricts in-river traffic. Waterborne craft must portage around the dam at this point. Access to the downstream area is through an unimproved trail open for pedestrian/portage use.

The City operates a park on the north bank of the river, between the City and railroad bridges.

<u>Cultural Resources</u> (See Section 4.11)

The project area has a long history of human habitation, with initial occupation as early as 12,000 B.C. More than 1,000 surveys have been conducted in the Russian River subregion and more than 100 sites have been excavated.

The project area is located within the territory of the Southern Pomo, one of seven groups under the Pomo label. Pomo settlements existed near the project area east of the Riverbend site, southeast of Healdsburg at a former lake or marsh, on Mill Creek at its confluence with the Russian River and south of the Doyle plant.

Surveys in the immediate vicinity of the project area included a two-mile survey performed along Highway 101, with negative findings; a survey in the vicinity of North Levee where an important prehistoric/ethnographic village site was located; a large survey on the west bank of the river south of North Levee to the north end of Middle Reach where the open extraction pits are located, with negative findings; a survey east of the South Levee Haul Road location, with negative findings; and two surveys on the west bank west and northwest of the Doyle Plant, also with negative findings.

The only listed Historical Landmark in the vicinity of the project is #893, the Walters Ranch Hop Kiln located at 6050 Westside Road, considered the most significant surviving example of a stone hop kiln in the North Coast.

Two field surveys were conducted on foot in August and October of 1991. No evidence of prehistoric use was present on any of the proposed mining site surfaces. No significant historic artifacts or sites were located on any of the mining sites. Various items of contemporary and possible earlier use were noted, but all were isolate finds, with little or no integrity of context--

items that had been tossed into the river or lost and appeared to have been moved about by the currents of the river.

Traffic (See Section 4.12)

The major roadways within the project vicinity are Highway 101, Old Redwood Highway, Healdsburg Avenue, River Road, Front Street, Magnolia Drive and Eastside Road. Access to the Syar processing plant and the Healdsburg Bendway and Riverbend sites is from Healdsburg Avenue. The entrance to the Doyle site is from Eastside Road. The remaining sites are reached by a Syar-owned haul road that originates at the Healdsburg plant.

Gravel trucks use the roadway system from 6:00am to 4:00pm, with maximum truck traffic occurring during the 7:00am to 9:00am commute period. Between Healdsburg and Santa Rosa, Highway 101 has the greatest number of truck trips, approximately 90 two-way trips during the am peak traffic hour.

All roadways in the project vicinity operate at acceptable service levels. Accidents involving gravel trucks are infrequent.

Air Quality (See Section 4.13)

There are several areas sensitive to air pollutants in the project vicinity. Most of these are residential developments. In addition, agricultural areas, churches, schools, roads and the river are places where the general public may be close to or in the project area.

At the Healdsburg monitoring station, the State's Particulate Matter (PM_{10}) standard was violated several times during the winters of 1987 and 1988 (the most recent years for which data are available). The closest monitoring station for ozone and carbon monoxide (CO), located in Santa Rosa, did not report any violations of state or federal standards for 1987, 1988 and 1989.

Aggregate mining will produce a number of air pollutants. PM_{10} and CO emissions occur when riparian vegetation is cleared and burned. The mining process itself will create Total Suspended Particulate and PM_{10} emissions. Transportation of aggregate along the haul road will generate PM_{10}, total organic gases and nitric oxides.

Noise (See Section 4.14)

One of the important noise sources contributing to the existing noise environment is motor vehicle traffic. Highway 101 is within a mile of the Middle Reach, North Levee, Healdsburg Bendway and Riverbend sites. There are three County arterials in the area that carry low volumes of traffic, Westside Road, Eastside Road and Old Redwood Highway.

The Northwestern Pacific Railroad roughly parallels Old Redwood Highway and Highway 101, just south of the Healdsburg Bendway site.

Aircraft noise in the project area is generated by flight operations at the Sonoma County Airport. The Sonoma County Airport is the busiest airport in Sonoma County, and is approximately three miles to the southeast of the Doyle site, the closest site.

There are several industrial noise sources in the area. Several lumber operations are in and near Healdsburg. Also, aggregate is being mined from Russian River terrace areas that are not part of the proposed project.

Most of the sensitive receptors (land uses that could be disturbed by project noise) are located in Healdsburg. The bluff along the Healdsburg Bendway contains several homes and a trailer park with views of the Bendway and Riverbend sites. An adult community is located north of the Riverbend site. At least one home in this development has line-of-sight access to the river. There are a few homes along the west side of the river, although none of these has visual access. Residences are sensitive to both indoor and outdoor noise levels 24-hours per day. A park is located just north of the Memorial Bridge, and several homes and developments along the Bendway and Riverbend sites have access to the river via paths. There are several schools in Healdsburg, including a middle and high school. The schools are sensitive to indoor and outdoor noise levels primarily during the day.

<u>**Public Health and Safety**</u> **(See Section 4.15)**

Public health and safety issues may arise from the use of heavy equipment, installation of temporary stream crossings and deep pit excavation during active aggregate mining operations. Excavation operations occurring farther away from residential areas, such as those in agricultural areas, tend to be less of a threat to the population than those in a more urban/residential setting. Reclaimed mining sites could also pose a threat to public safety if unsafe conditions are allowed to persist following reclamation.

Instream mining operations typically require the installation of temporary stream crossings, which can create hazards for river recreationists and canoeists. Box-culvert river divisions create river level drop-off or spillovers that can upset canoes and/or potentially injure river recreationists unaware of their presence.

Certain mining operations pose potential hazards to the public. Open pits present hazards due to their steep and possibly unstable slopes. Heavy machinery could create dust and noise hazards, as well as potential injury. Ponded water within excavation pits has the potential to breed mosquitoes and create a public hazard.

The use of heavy equipment during aggregate extraction often requires storage of hazardous materials such as fuels, oils/lubricants and solvents on site. There is the potential for a spill to occur and possibly expose workers and/or the public.

<u>Socioeconomic Concerns</u> (See Section 4.16)

The population of Sonoma County in 1990 was 388,222 persons. The City of Healdsburg reported a total population of 9,469 persons. Most planning areas within the County are projected to grow near the countywide average of 41 percent by 2010. However, the highest percentage gain is projected for Healdsburg, at 90 percent, while the lowest change is projected for the Russian River, and the Sebastopol planning areas with 22 and 23 percent, respectively.

Sonoma County worker categories are very similar to those of the state and the City of Healdsburg. Two exceptions worthy of note are a higher proportion of self-employed persons within the County and a correspondingly lower proportion of persons who work for private employers.

The City has higher proportions of persons employed in the private sector, primarily due to a lack of major government-sector employment. The City has higher proportions of persons employed in retail, public administration, and construction industries than the state as a whole, and Sonoma County as a whole. However, fewer City residents are employed in professional services, durable-goods manufacturing, and wholesale industries.

POTENTIAL AREAS OF CONTROVERSY

The proposed project has generated some controversy since its inception. The issues most often raised are:

- Effects on stream channel morphology
- Effects on groundwater
- The effectiveness of reclamation to achieve its stated objectives
- Impacts on agriculture
- Hazards to surface water quality and fish resources
- The need for a cost-effective source of aggregate
- The loss of aesthetic and recreational qualities
- Effects on riparian vegetation

EFFECTS FOUND NOT TO BE SIGNIFICANT

A Notice of Preparation (NOP), Notice of Intent (NOI) and an Initial Study (IS) were prepared for the project and circulated on November 4, 1991. One of the functions of the NOP/NOI process is to identify issue ares which are not likely to be significantly affected by the proposed project or alternatives. According to the NOP/NOI/IS, the project would not interfere with any emergency response or evacuation plans. No changes to population or housing supply and demand would be expected. The project would not affect existing parking facilities or create new demand for parking. Waterborne, rail and air traffic would be unaffected. Public services, including fire protection, law enforcement, and schools, and utilities would not be affected. Finally, no impacts on ethnic cultural values or religious or sacred uses were anticipated. Since

the project was determined to leave these areas unaffected, they are not addressed in this EIR/EIS.

SIGNIFICANT IMPACTS

The following is a summary of significant impacts expected to result from implementation of the proposed project or alternatives. Potential impacts that are considered less than significant are addressed in Chapter 4, and can be found in Table 2-1.

<u>Geology and Soils</u> (See Section 4.2)

Slope instability could result from terrace and gravel bar extraction under Alternatives 2 through 5. Extraction at the Doyle site and, under Alternative 5, at the Middle Reach site would create a large pit. If the slopes of that pit are too steep, they could be unstable, particularly during seismic events, creating hazard for workers and others on the site. Slope instability can be a less-than-significant impact if ARM Plan slope requirements [1:1 (H:V) maximum] are followed, and a Registered Geotechnical Engineer or Certified Engineering Geologist evaluates the stability of slopes greater than 1:1 (H:V).

Mining at the Doyle site would involve removing and stockpiling topsoil. If the topsoil stockpiles are allowed to erode into the river, water quality could be degraded. This impact could be fully mitigated by following County erosion control methods, placing topsoil stockpiles behind existing berms, and constructing a sediment detention pond on site to collect all site runoff.

<u>Hydrology and Channel Dynamics</u> (See Section 4.3)

The potential long-term effects of the proposed reclamation plans and associated mining activities on the morphology of the Russian River stream channel is of key concern because of the wide-ranging ramifications of such effects in a number of issue areas. These ramifications largely center on the projects potential to exacerbate degradation of the thalweg which, simply put, refers to a lowering in the elevation of the streambed. Degradation could occur upstream or downstream, as well as within, the project site. This lowering does not refer specifically to proposed extraction of gravel from the stream channel. It refers instead to the year-to-year degradation of the streambed brought about by extracting more gravel from the river than is annually replenished.

Streambed degradation may have several adverse environmental consequences including:

- the lowering of groundwater tables in aquifers that are hydraulically connected to the river;
- potential reductions in the productivity or water quality of municipal and/or private wells;

- potential reductions in riparian vegetation regeneration;
- potential increases in bank erosion and channel instability;
- reductions in the structural stability of bridges such as the Highway 101 bridge in Healdsburg; and
- degradation of fisheries resources.

An analysis of the potential for the proposed project and project alternatives to result in streambed degradation is presented in Section 4.3 of this Draft EIR/EIS. The results of this analysis indicate that, based on a projected annual replenishment rate of 130,000 tons per year in project area, the proposed project would result in streambed degradation over time. This degradation would result in potentially significant adverse effects on bank erosion, riparian vegetation regeneration, bridge stability, water quality and well production. Except for bridge instability, these impacts are not mitigable. The No Project Alternative, Limited Bar Skimming Alternative, and Terrace Skimming Alternative would not result in significant streambed degradation.

Under Alternatives 2 through 4, the Russian River's meander pattern moves downstream and could "capture" the Doyle Pit, which, at certain flows, could result in severe degradation and headcutting. There are no mitigation measures for this impact.

Alternatives 2 and 3 would arrest point bar building and, to an extent, lateral erosion of the river bank by removing bar aggradation. The construction of spurs at the Healdsburg Bendway (Alternative 2) could expand low floodplain area for deposition of fine sediment, which would allow increased growth of riparian vegetation. These are considered beneficial impacts.

<u>Surface Water Quality</u> (See Section 4.4)

The only significant effect on water quality was attributed to Alternative 2, which would create 16-foot pools at the Middle Reach, Healdsburg Bendway and Riverbend sites. This excavation could release fine sediments into the river, which would lower water quality. The construction of a temporary secondary de-silting pond downstream of each extraction area could keep fine sediment from entering the river at low flows, when the affect on water quality is greatest.

<u>Groundwater</u> (See Section 4.5)

Excavation of the Doyle pit (Site 1) is proposed for Alternatives 2, 3 and 4. This excavation, in combination with other terrace mining operations in the immediate area may affect local groundwater supplies and movement by, essentially, creating a barrier within the aquifer which would hinder or prevent such movement. On a project-specific basis, this potential impact is considered mitigable to a less-than-significant level by maintaining a 10-foot layer of permeable gravels at the bottom of the Doyle pit. In light of other terrace operations in the area however, this impact is considered <u>cumulatively</u> significant and unavoidable through mitigation.

Pumping lift costs at the Fitch Mountain Well Field could increase during low flow periods if the groundwater table is lowered by channel degradation due to instream mining. This impact could be offset by having the proponent pay for the additional costs, to the extent that the project is responsible. The extent of responsibility would be determined through the implementation of a proposed monitoring plan.

The Floodplain Skimming/Streamway Development Alternative (Alternative 5) would have the benefit of reestablishing the pre-1950s groundwater regime in the local reach, possibly increasing groundwater recharge.

<u>Fish Resources</u> (See Section 4.6)

The proposed reclamation plans and associated mining operations have the potential to significantly affect anadromous[13] and resident fish species in a number of ways. The proposed project (Alternative 2) would adversely affect fish through the modification of the stream channel, potential increases in fish entrapment associated with terrace and channel operations, loss of in-channel riparian vegetation used as cover for young fish, and potential increases in siltation associated with proposed streamside stockpiles on the Doyle site. Also, the creation of deep pools could increase predation on outmigrating anadromous fish and tule perch.

Alternatives 3 and 4, to limited degrees, would result in similar impacts to those mentioned above except that no channel excavation is proposed under these alternatives. Therefore, fish entrapment and habitat modification impacts associated with Alternative 2 would not occur under Alternatives 3 and 4. Aside from the relatively minor loss of some riparian vegetation associated with Alternative 5, no adverse impacts on fish resource are anticipated as a result of implementation of Alternative 5.

Effects of the proposed reclamation and mining operations on stream turbidity have been shown be largely insignificant in relation to its effect on migratory and resident fishes.

Several of the direct significant impacts on fish resources associated with the proposed project and alternatives are considered mitigable to a less-than-significant level. The potential for the deep pools to make outmigrating anadromous fish and the Russian River tule perch vulnerable to predation could be lessened by monitoring the pools, and, if they are not being used by migratory salmonids or tule perch, providing cover objects for refuge and undertaking predator control programs. At this time, the effectiveness of these measures is uncertain, so the impact of the pools is considered potentially significant and unavoidable. Other impacts associated with Alternative 2 that could be significant and unavoidable are loss of ripple habitat and removal of large substrates, which could reduce the survival rates for juvenile fish and the production of aquatic invertebrates, and cumulative adverse effects on resident and migratory species. Under all of the alternatives, the Doyle Pit could entrap migrating salmonids, and no mitigation is available for this impact.

<u>Terrestrial Biological Resources</u> (See Section 4.7)

Impacts on wildlife and plants generally concern damage to or loss of either riparian habitat or individual members of particular species dependent on that habitat. Alternatives 2 through 5 could result in the loss of individuals within several species, including Sonoma alopecurus, the California red-legged frog, the foothill yellow-legged frog and the northwestern pond turtle. In each case, the effects may be negated by surveying areas of potential habitat prior to mining and reclamation, and developing appropriate techniques for avoidance should any individuals be found. In addition, mining and reclamation activities could disturb and/or reduce the amount of riparian habitat in the project area and the breeding habitats of raptors, the yellow-breasted chat and the yellow warbler. Lost riparian habitat can be replaced according to the specific methods described in Section 4.4, but both direct and cumulative impacts would remain significant for Alternatives 2, 3 and 4. If surveys indicate that nests of the above-mentioned species are present, mining and reclamation activities can be planned around the breeding season and/or buffers used to minimize disturbances to nests.

Alternative 5 would have a beneficial impact by creating topographic diversity in the stream channel and, thereby providing opportunities for expansion of the riparian vegetation corridor.

<u>Land Use</u> (See Section 4.8)

For Alternatives 2 through 5, noise, dust and visual disturbances resulting from mining and reclamation activities may affect residents in the vicinity. These effects, and measures to reduce them, are discussed in detail in Sections 4.9, Visual Quality, 4.13, Air Quality and 4.14, Noise.

The State Lands Commission (SLC) contends that the State of California holds title to lands beneath the stream channel and therefore has jurisdictional authority over its use. As such, the proposed project may be required to obtain a permit, lease or entitlement from the SLC prior to the commencement of gravel operations. This position is being contested by the project proponent, which claims that their vested rights to resources at five of the proposed sites would allow mining without obtaining such a permit. Currently, this dispute is in litigation.

Zoning conflicts would occur under Alternative 5, because the Middle Reach terrace is zoned for agriculture, and Syar does not have vested rights for the property. Consequently, a zoning change would be required before mining and reclamation activities could begin. Where Syar holds vested rights (Alternatives 2 through 4), consistency with zoning is unnecessary.

Alternative 5 would also result in an unmitigable loss of prime farmland, contributing to regional losses of farmland.

<u>Visual Quality</u> (See Section 4.9)

Alternatives 2 through 5 would result in periodic, short-term changes to the visual character of the project area. There are no mitigations for these visual impacts. However, for the most part, since the area has been mined, the changes would not be considered great. After reclamation, the visual quality of the area would improve beyond the existing conditions.

Alternatives 2 and 3 would not be conducive to the City of Healdsburg's General Plan's measures to make entrances to the city (such as Healdsburg Avenue) distinctive and memorable. During part of the year, mining and reclamation activities would be visible from Healdsburg Avenue and Highway 101. This impact would be short-term and unmitigable.

The spurs proposed for the Healdsburg Bendway under Alternative 2 would permanently alter the visual characteristics of the site. This would be an unmitigable impact.

Equipment and truck traffic associated with mining and reclamation activities (Alternatives 2 through 5) could produce a short-term increase in the amount of glare and night lighting visible in the project vicinity. The former effect can be reduced by painting bare metallic surfaces. Night lighting can be minimized by using it only where necessary for safety and security, and shading lights and directing them away from residential areas and roadways.

Under Alternatives 2 through 5, alterations to the existing views in the project vicinity were found significant and unavoidable when considered with other similar projects in the region.

<u>Recreation</u> (See Section 4.10)

Alternatives 2 through 4 include construction of temporary stream crossings to provide access from the road to gravel bars. During the summer, such crossings would create barriers to canoes and boats. This problem could be alleviated by ensuring that well-marked portage areas are created.

Alternatives 2 through 4 would have short-term, adverse affects on recreational pursuits like birdwatching, hiking and water travel. There are no mitigations for these impacts. At the Healdsburg Bendway, Alternative 2 would result in the construction of five spurs, which could create hazards or obstacles for boaters and swimmers. The affects of the spurs would be less than significant, if they are adequately posted.

<u>Cultural Resources</u> (See Section 4.11)

The prehistoric/ethnographic site near the North Levee site could be disturbed by project-related activities. This area should be avoided. Although no culturally significant artifacts or sites were found within the project area, anytime excavation occurs, it is possible that artifacts will be unearthed. Therefore, the DEIR/EIS recommends that if any cultural remains are encountered during the mining or reclamation process, all work in the vicinity of the discovery stop until a professional archaeologist can ascertain the significance of the artifacts, and appropriate agencies can be notified. Furthermore, the EIR/EIS recommends that a cultural orientation be conducted prior to mining at the Doyle, North Levee and Middle Reach sites.

<u>Traffic</u> (See Section 4.12)

This Draft EIR/EIS examines the impacts of mining and reclamation at the six sites described above. The activities of the processing plant are not evaluated as that plant is a permitted use and not currently subject to review by any of the lead agencies involved in this EIR/EIS process.

Consequently, only truck trips to the plant are examined, not those leaving the plant. Under Alternatives 2 through 5, public roadways would not be affected by the project. However, under Alternative 1, the project area would not be used as a source of gravel, so gravel may be shipped along public roadways from other areas, possibly even outside the County. In order to minimize the effects of Alternative 1, the DEIR/EIS recommends that the County's ARM Plan update ensure that aggregate comes from sources that won't adversely affect County roadways.

Air Quality (See Section 4.13)

Northern Sonoma County meets all federal air quality standards, but exceeds the state standard for particulate matter smaller than 10 microns (PM_{10}) during the winter months. Under Alternatives 2 and 3, significant emissions would result from equipment used at the mining sites and hauling gravel to the processing plant. In addition, Alternative 2 would create air pollutants from equipment used to construct the spurs at the Healdsburg Bendway. By changing the amount of gravel extracted by phase, air quality impacts could be reduced. However, when project-related emissions are added to cumulative development in the vicinity, air quality impacts would be considered significant for all alternatives. These impacts could be partially offset by avoiding unnecessary idling of fuel-consuming equipment.

Noise (See Section 4.14)

The DEIR/EIS examines the effects of project-generated noise on "sensitive receptors", such as residential areas, schools and churches. Most of the sensitive receptors in the project area are located in Healdsburg. In addition, some residents are located along Westside Road, Eastside Road and Old Redwood Highway.

Alternatives 2 and 3 would be expected to create unacceptable and unmitigable noise levels at the Healdsburg Bendway and Riverbend sites. For the most part, these effects would last from 7 AM to 3:30 PM, Monday through Friday, whenever mining was underway at one of the two sites.

Public Health and Safety (See Section 4.15)

Health and safety hazards may occur in several ways. Stream crossings that create riverwide obstructions can upset canoes or trap boaters. Open pits often have steep, unstable slopes, and ponded water can provide breeding habitat for mosquitos, which can be vectors for disease. Hazardous materials, such as fuels, oils or lubricants and solvents are likely to be stored on site. The spurs proposed for the Healdsburg Bendway under Alternative 2 could create boating hazards when the Healdsburg Dam flashboards are in place.

Under Alternatives 2 through 5, mining at the Doyle site (and the Middle Reach for Alternative 5) could result in deep open pits and ponded water. The former hazard can be reduced by restricting public access and using appropriate side slopes for the pits. Ponded water need not be a significant effect if the proponent complies with Sonoma County Mosquito Abatement District requirements. Hazards from stream crossings, which would be significant under Alternatives 2 through 4, could be reduced by providing portage routes. Under Alternatives 2

and 3, a concrete culvert would be used for two stream crossings, possibly creating an unsafe drop-off or spill-over. The DEIR/EIS recommends that signs indicate the hazards and identify portage options. General safety hazards expected with Alternatives 2 through 5 would be reduced by compliance with applicable state and local laws, regulations and codes. Hazards associated with the spurs at the Healdsburg Bendway could be reduced by posting warning signs indicating the location and depth of each spur.

Under Alternatives 2 through 5, trucks traveling along the haul road could pose safety hazards to bicyclists and pedestrians using the road. Posting signs in English and Spanish stating that heavy vehicles use the road would reduce this impact.

<u>Socioeconomic Concerns</u> (See Section 4.16)

Alternatives 2 through 5 could have a beneficial impact on the County and the City by providing job opportunities in mining and reclamation. At the same time, the value of property adjacent to each site may decrease because of the proximity of mining and reclamation activities. Because many factors contribute to property values, the effects of the alternatives cannot be quantified, and there are no mitigation measures available.

UNAVOIDABLE SIGNIFICANT IMPACTS

Most of the impacts that are considered significant under CEQA and NEPA could be reduced to less-than-significant levels by implementing the mitigation measures identified in this EIR/EIS. However, some impacts are unmitigable. These include:

- Increased streambed degradation and related adverse effects (Alternatives 2 and 3)
- Reduced groundwater well production (Alternatives 2 through 4)
- Reduced transit time for groundwater flow (Alternatives 2 through 5)
- Reduced survival of juvenile salmonids and aquatic invertebrates (Alternative 2)
- Increased vulnerability of Russian River tule perch and outmigrating anadromous fish to predation (Alternative 2)
- Entrapment of migrating salmonids at the Doyle site (Alternatives 1 through 5)
- Loss of riparian habitat (Alternatives 2 through 4)
- Adversely altered views of the project area (Alternatives 2 through 5)
- Conflicts with the Healdsburg General Plan (Alternatives 2 and 3)
- Changes in the recreational value of the river (Alternatives 2 through 4)
- Cumulative reductions in regional air quality (Alternatives 1 through 5)
- Unacceptable noise levels around the Healdsburg Bendway and Riverbend sites (Alternatives 2 and 3)
- Potential reductions in property values on adjacent lands (Alternatives 2 through 5)

In some instances, the Draft EIR/EIS identifies mitigation measures that could reduce the severity of these impacts, but not to a less-than-significant level.

ENVIRONMENTALLY SUPERIOR/PREFERRED ALTERNATIVE

Based on the impact evaluation presented in Section 4 of this Draft EIR/EIS, the "Environmentally Superior/Preferred Alternative" was determined to be the No Project Alternative. The Floodplain Skimming Alternative (Alternative 5) was found to be environmentally superior to each of the other three alternatives (Alternatives 2, 3, and 4).

SUMMARY OF IMPACTS WITHIN THE CITY OF HEALDSBURG

As noted earlier, the Healdsburg Bendway site is within the City of Healdsburg. This site is not vested, so Syar Industries must obtain a permit and approval of a reclamation plan before mining in the Bendway or constructing the proposed spurs. The City is the lead agency for the Bendway environmental analysis, and will be responsible for ensuring that applicable mitigation measures are implemented.

The Healdsburg Bendway has been evaluated in every section of the EIR/EIS. Some effects, such as river bed degradation, must be considered in concert with the entire project. Other impacts, such as increased noise, can be treated separately. Table 2-1, Summary of Impacts and Mitigation Measures, lists all impacts found in this EIR/EIS, along with recommended mitigation measures. The left-hand column of Table 2-1 has an "H" to indicate any impact that applies to the Healdsburg Bendway.

This section summarizes by topic the impacts and mitigation measures that are associated with mining and reclamation in the Healdsburg Bendway. For a complete analysis, including existing conditions, applicable general plan policies, standards of significance, methods of analysis, impacts, levels of significance and mitigation measures, please see Chapter 4. A complete description of the alternatives can be found in Chapter 3.

Project Location

The Healdsburg Bendway is located in the southeast portion of the City of Healdsburg. The Russian River enters the Bendway from the east, and forms a 90 degree angle at the Bendway, turning south toward the Pacific Ocean. Residential areas lie to the north and west of the Bendway. A trailer park is located on the bluff, above the Bendway's apex. Some industrial and commercial uses occur on the west and east of the Bendway's downstream end, including Syar's processing plant. A relatively dense band of riparian vegetation occupies the low-lying area adjacent to the outer bank of the bend. Figure 2-2 shows existing uses in the Healdsburg Bendway area.

Immediately downstream of the Bendway, the Russian River is spanned by a railroad bridge, the Healdsburg Avenue bridge, the Healdsburg Dam, which is used in the summer to create a large backwater for recreation, and the Highway 101 bridge. A long, narrow park is located between the railroad and Healdsburg Avenue bridges. The Healdsburg Veterans Memorial Park, a large County-operated facility, is located south of the Healdsburg Avenue bridge. The City's Fitch

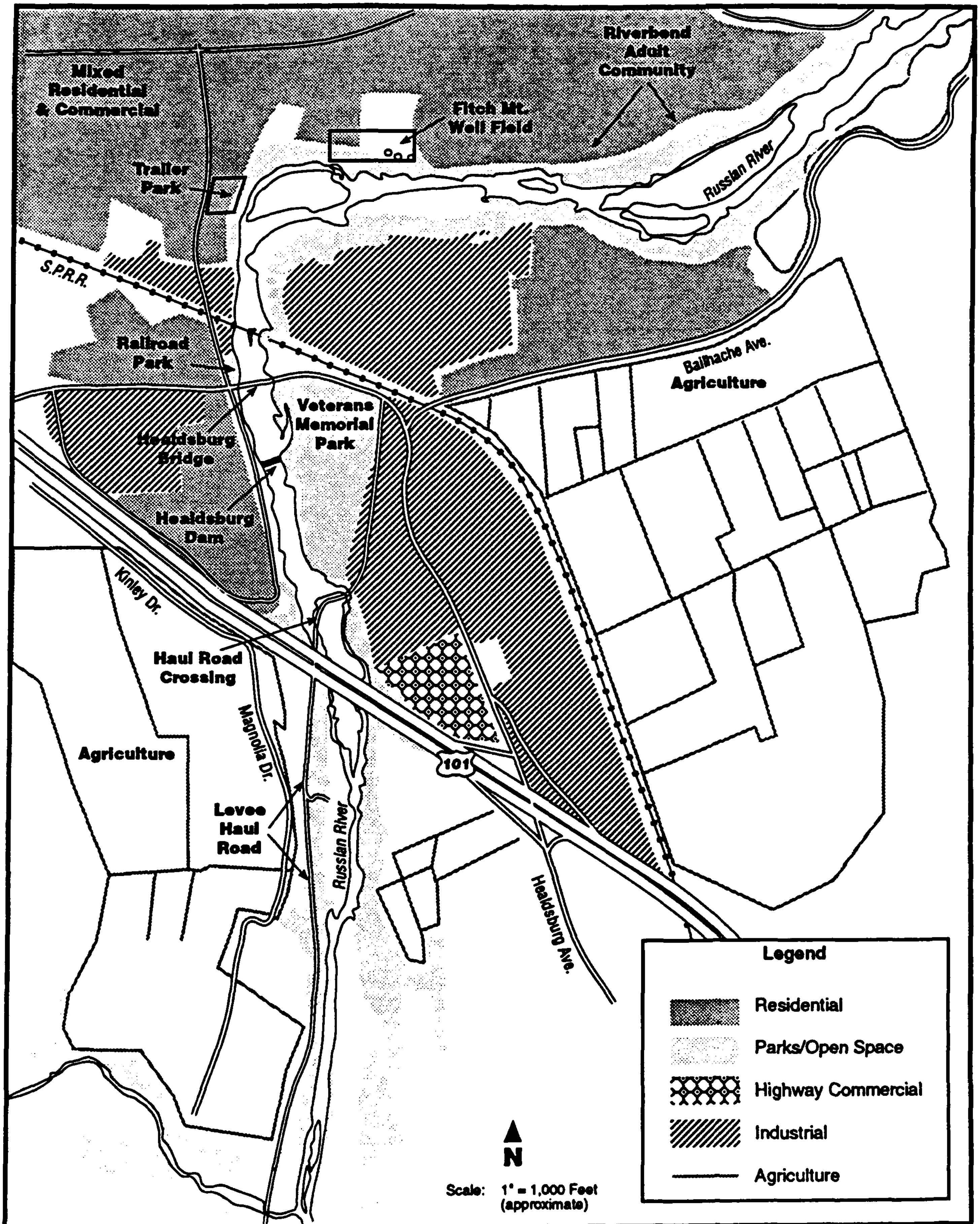

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Figure 2-2
Existing General Land Uses

Mountain Well Field, which provides domestic water to the city, is adjacent to the river on the north side of the upstream end of the Bendway site.

<u>**Description of the Alternatives**</u> (See Chapter 3)

Under Alternatives 1, 4 and 5, no mining or reclamation would occur in the Bendway. Alternative 2 is the proposed project, based on the reclamation plan submitted by Syar Industries. The Bendway would be mined and reclaimed under Alternative 3 also, but lower levels of gravel would be extracted than under Alternative 2, and no excavation below the low-flow surface elevation would occur.

Three gravel bars are located within the Healdsburg site (see Figure 2-3). These are shown as bars A, B, and C in Figure 3-13 in Chapter 3. According to the reclamation plan submitted by the project applicant, the applicant proposes to excavate Bars A and B to a depth equivalent to the current river bed elevation (see Figure 3-14). Bar C would be excavated to a maximum depth of 16 feet below the current river bed elevation (see Figures 3-14 and 3-15). To accomplish this, approximately 0 to 20 feet of sand and gravel on Bar A would be excavated to reach the present thalweg elevation, which ranges from approximately 62 to 72 feet above mean sea level (msl). Bar B would be mined to the low flow river bank from bank to bluff line. Intermittent mining would be done to maintain Bar C at 16 feet below the bed level. Figures 3-14 and 3-15 provide representative schematic cross-sections for the three bars. Table 3-2 details the mining schedule for this site, with estimates that initial mining will occur over two seasons and be limited to the period of September 1 to November 1. Excavation would be accomplished using a dragline. Haul units would be used to haul materials to the nearby processing plant.

To excavate Bar B, it will be necessary to construct a temporary stream crossing. The crossing would consist of approximately 6 20-foot lengths of 42-inch diameter steel pipe, covered with native materials and removed upon completion of the annual extraction and hauling process (no later than November 1).

According to the reclamation plan, a total area of 10.5 acres will be excavated at the Healdsburg site, and the annual volume of mined aggregate will average approximately 75,000 cubic yards, or 101,250 tons.

Details of the proposed excavation of the Healdsburg Bendway site are described in a report prepared by Simons and Associates, Inc., *Mining Plan and Reclamation Plan in the Healdsburg Bendway*. The report states that one of the primary benefits of the excavation plan is the improvement of hydraulic conditions at the Healdsburg site. These improvements are necessary, according to the plan, because of "erosional processes" that have led to "increased destabilization of the bluff line above the bend." According to the applicant, this destabilization is due to the formation of a "landward pocket" in the bluff caused by erosion.

The proposed plan for bar excavation is intended to redirect river flow away from the bluff in order to relieve the erosional pressures. Excavation of Bars A and B would stabilize the river channel and reduce the erosion potential on the adjacent bluff, while Bar C would serve primarily as a source of gravel. In order to maintain the positive benefits of the plan, the applicant

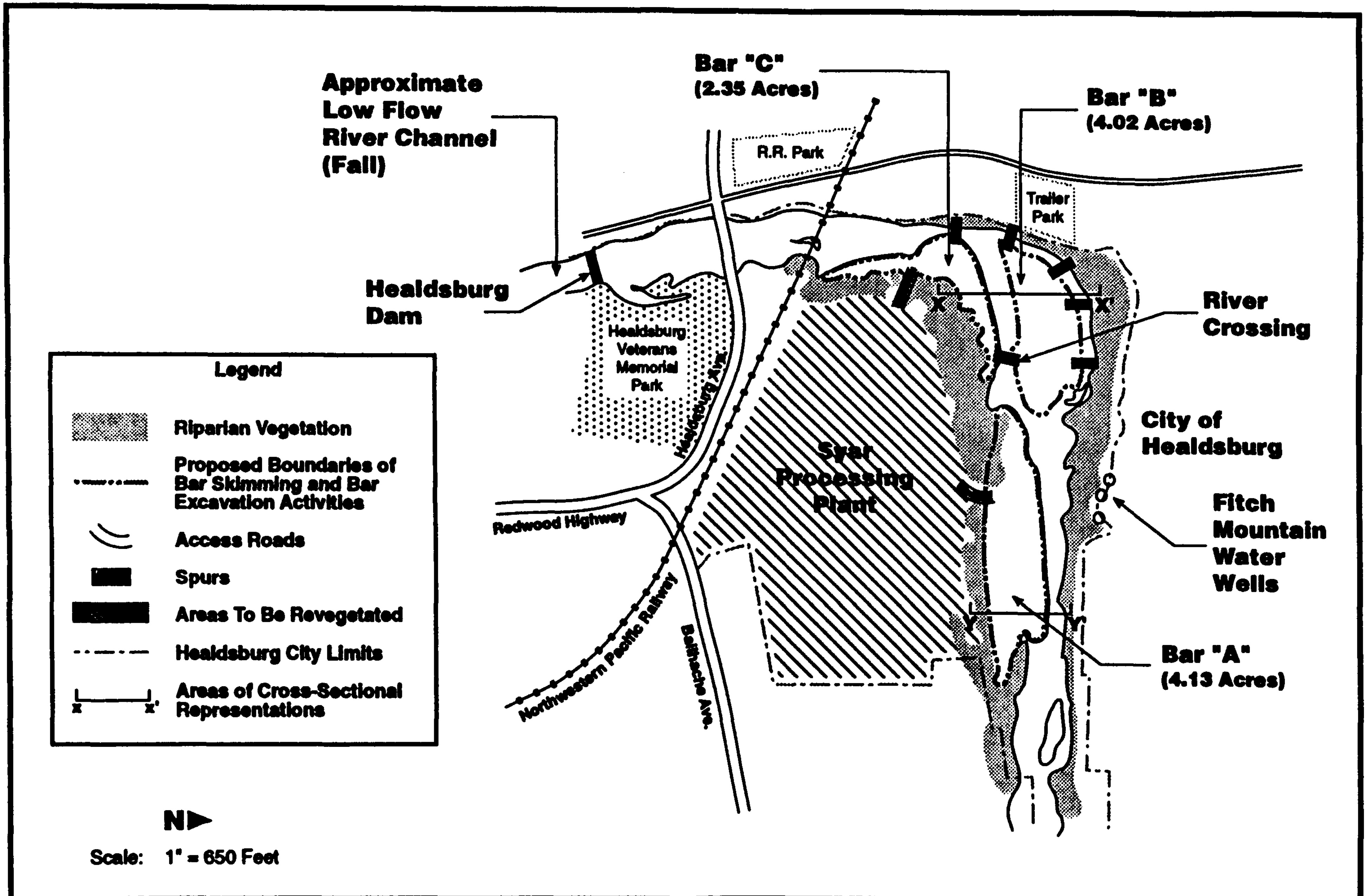

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Figure 2-3
Healdsburg Bendway Site
Proposed Bar Excavation Activities

suggests that intermittent mining (subsequent to the initial excavation) be conducted on Bars A and B to maintain optimum hydraulic conditions throughout the bendway. The applicant would continue to mine Bar C intermittently to maintain a maximum depth of 16 feet below the average bed level.

With implementation of the proposed excavation plan, it would be necessary, according to the project applicant, to "move the flow away from the bluff line." To accomplish this, the applicant proposes to construct five spur levees along the outer edge of the bend. The proposed locations of these spurs are shown in Figure 3-13. The spurs would be between 100 and 180 feet long with a top width of 8 to 10 feet and side slopes of 2:1 (H:V) (see Figure 3-16). The spurs would be 10 to 12 feet tall and would be buried two feet in the riverbed. The base of the spurs would be roughly 48 feet wide. The elevation of the top of the spurs would range from 72 feet to 82 feet (downstream to upstream). The annual low water surface elevation is approximately 73.9 feet, which typically occurs after Labor Day. At this water level, four of the spurs would be exposed approximately 8 feet above the waterline. The downstream spur would be 2 feet below the surface. With the flashboards up at the Healdsburg Dam (typically in place from Memorial Day to Labor Day), the water surface elevation rises to 80.5 feet, so the downstream spur would be 7.5 feet below the water. The remaining four spurs would be visible up to 1.5 feet above the water.

As shown in Figure 3-18, excavation and spur construction is expected to facilitate the formation (aggradation) of a new bar. This new bar would likely be located in roughly the same location as Bar C. This is inconsistent with statements made in the text of the reclamation plan, which call for continued excavation of Bar C to a maximum depth of 16 feet below the average bed elevation.

Significant Impacts and Mitigation Measures for the Healdsburg Bendway Site

Hydrology and Channel Dynamics (See Section 4.3)

The potential long-term effects of the proposed mining and reclamation of the Healdsburg Bendway on the morphology of the Russian River stream channel is of key concern because of the wide-ranging ramifications of such effects in a number of issue areas. These effects largely center on the alternatives' potential to exacerbate degradation of the thalweg which, simply put, refers to a lowering in the elevation of the streambed. Degradation could occur upstream or downstream, as well as within, the project site. This lowering does not refer specifically to proposed extraction of gravel from the stream channel. It refers instead to the year-to-year degradation of the streambed brought about by extracting more gravel from the river than is annually replenished.

Streambed degradation may have several adverse environmental consequences including:

- the lowering of groundwater tables in aquifers that are hydraulically connected to the river;

- potential reductions in the productivity or water quality of municipal and/or private wells;
- potential reductions in riparian vegetation regeneration;
- potential increases in bank erosion and channel instability;
- reductions in the structural stability of bridges such as the Highway 101 bridge in Healdsburg; and
- adverse effects on some fish species.

An analysis of the potential for the proposed project and project alternatives to result in streambed degradation is presented in Section 4.3 of this Draft EIR/EIS. The results of this analysis indicate that, based on a projected annual replenishment rate of 130,000 tons per year in project area, the proposed project would result in streambed degradation over time. This degradation would result in potentially significant adverse effects on bank erosion, riparian vegetation regeneration, and bridge stability. Mining at the Bendway would contribute to these impacts, which are not fully mitigable.

Alternatives 2 and 3 would arrest point bar building and, to an extent, lateral erosion of the river bank by removing bar aggradation.

Surface Water Quality (See Section 4.4)

The only significant effect on water quality was attributed to Alternative 2, which would create a 16-foot pool at the Healdsburg Bendway site. This excavation could release fine sediments into the river, which would lower water quality. The construction of a temporary secondary de-silting pond downstream of each extraction area could keep fine sediment from entering the river at low flows, when the affect on water quality is greatest.

Groundwater (See Section 4.5)

Pumping lift costs at the Fitch Mountain Well Field could increase during low flow periods if the groundwater table is lowered by channel degradation due to mining at the Healdsburg Bendway site. This impact could be offset by having the proponent pay for the additional costs attributable to mining activity. A monitoring plan would be developed to determine the extent that the project is responsible for lowering the groundwater table.

Fish Resources (See Section 4.6)

Excavation and reclamation of the Healdsburg Bendway site under Alternatives 2 and 3 have the potential to significantly affect Russian River fish resources, particularly anadromous fish species, which use the project area primarily as a migration corridor to and from upstream spawning areas. Potential areas of concern include loss of riparian cover for young fish, reductions in terrestrial insect production resulting from reductions in riparian vegetation, entrapment of fish

resulting from gravel skimming or bar excavations, and the loss of riffle habitat which is a primary source of aquatic invertebrates, the main food item for young fish in the river.

Under Alternative 2, proposed operations at the Healdsburg Bendway site would result in relatively minor losses of riparian vegetation. The bars proposed for excavation and skimming currently support little established vegetation. A total of from 0.3 to 0.6 acres of dense mid-successional riparian habitat would be lost as a result of spur construction, but this loss is expected to be offset by the spurs' enhancement of sediment deposition along the bank and future expansion of the riparian corridor into areas behind the spurs.

Because excavation of the Bars B and C would not occur within the stream channel, and because the finished elevation of Bar C would be below the low-flow channel elevation, no significant fish entrapment is anticipated at the Bendway site. The proposed reclamation of the Healdsburg site would likely result in the loss of some existing riffle habitat in the Bendway. Due to the potential loss of aquatic invertebrate production, this is considered a significant impact.

Under Alternative 3 at the Bendway site, operations would be limited to gravel bar skimming. This would present no significant impact on resident or migratory fishes.

Terrestrial Biological Resources (See Section 4.7)

Impacts on wildlife and plants generally concern damage to or loss of either riparian habitat or individual members of particular species that are considered threatened, endangered, or of concern dependent on that habitat. Alternatives 2 and 3 could result in the loss of individuals within several species, including Sonoma alopecurus, the red-legged frog, the foothill yellow-legged frog and the northwestern pond turtle. In each case, the effects may be negated by surveying areas of potential habitat prior to mining and reclamation, and developing appropriate techniques for avoidance should any individuals be found. In addition, mining and reclamation activities could disturb and/or reduce the amount of riparian habitat in the project area and the breeding habitats of raptors, the yellow-breasted chat and the yellow warbler. Lost riparian habitat can be replaced according to the specific methods described in Section 4.4. If surveys indicate that nests of the above-mentioned species are present, mining and reclamation activities can be planned around the breeding season and/or buffers used to minimize disturbances to nests.

The construction of spurs at the Healdsburg Bendway (Alternative 2) could expand low floodplain area for deposition of fine sediment, which would allow increased growth of riparian vegetation along the outer bank of the bend.

Land Use (See Section 4.8)

For the Healdsburg Bendway site under Alternatives 2 and 3, noise, dust and visual disturbances resulting from mining and reclamation activities may affect residents in the vicinity. These effects, and measures to reduce them, are discussed in detail in Sections 4.9, Visual Quality, 4.13, Air Quality and 4.14, Noise.

The State Land Commission (SLC) contends that the State of California holds title to lands beneath the stream channel and therefore has jurisdictional authority over its use. As such, the proposed project may be required to obtain a permit, lease or entitlement from the SLC prior to the commencement of gravel operations. This position is being contested by the project proponent, which claims that its vested rights to resources at five of the proposed sites would allow mining without obtaining such a permit. Currently, this dispute is in litigation.

Visual Quality (See Section 4.9)

Implementation of Alternatives 2 and 3 at the Healdsburg Bendway site would not be conducive to the City of Healdsburg's General Plan's measures to make entrances to the city (such as Healdsburg Avenue) distinctive and memorable. During part of the year, mining and reclamation activities would be visible from Healdsburg Avenue and Highway 101. This impact would be short-term and unmitigable.

The spurs proposed for the Healdsburg Bendway under Alternative 2 would permanently alter the visual characteristics of the site. This would be an unmitigable impact.

Under Alternatives 2 and 3, alterations to the existing views in the project vicinity were found significant and unavoidable when considered with other similar projects in the region.

Recreation (See Section 4.10)

The Russian River at the Healdsburg Bendway site supports extensive water-related recreational activities, including swimming, fishing and canoeing.

Alternatives 2 and 3 include construction of temporary stream crossings to provide access from the road to gravel bars at the site. These crossings may affect recreational activities particularly canoeing. By ensuring that portages for canoeists are well-marked, significant impacts on canoeists at the Bendway site would be avoided.

At the Healdsburg Bendway, Alternative 2 would result in the construction of five spurs, which could create hazards or obstacles for boaters and swimmers. The affects of the spurs would be less than significant, if they are adequately posted.

Cultural Resources (See Section 4.11)

Although no culturally significant artifacts or sites were found within the Healdsburg Bendway site during a field survey, anytime excavation occurs, it is possible that artifacts will be unearthed. Therefore, the DEIR/EIS recommends that if any cultural remains are encountered during the mining or reclamation process, all work in the vicinity of the discovery stop until a professional archaeologist can ascertain the significance of the artifacts, and appropriate agencies can be notified.

Traffic (See Section 4.12)

This Draft EIR/EIS examines the impacts of mining and reclamation at the six proposed sites. The activities of the processing plant are not evaluated, since that plant is a permitted use and not currently subject to review by any of the lead agencies involved in this EIR/EIS process. Consequently, only truck trips to the plant are examined, not those leaving the plant. Under Alternatives 2 and 3, public roadways would not be affected by proposed mining and reclamation operations. Spur construction, however, would involve the importation of rock material from the Santa Rosa area. This would involve approximately 250 to 400 truck trips during one season (September 1 through November 1). For this purpose, trucks would exit Highway 101 onto Redwood Road and travel to the Syar processing plant. All roadways in the study area currently operate at Level of Service (LOS) A. The proposed operations at Healdsburg Bendway under Alternatives 2 and 3 would not lower the service level below "C", and therefore, is considered less than significant.

Air Quality (See Section 4.13)

Northern Sonoma County meets all federal air quality standards, but exceeds the state standard for particulate matter smaller than 10 microns. Proposed operations at the Healdsburg Bendway site under Alternatives 2 and 3, would result in significant emissions from equipment used at the mining sites and hauling gravel to the processing plant. In addition, Alternative 2 would create air pollutants from equipment used to construct the spurs. By changing the amount of gravel extracted by phase, air quality impacts could be reduced. However, when project-related emissions are added to cumulative development in the vicinity, air quality impacts would be considered significant for Healdsburg Bendway under Alternatives 2 and 3. These impacts could be partially offset by avoiding unnecessary idling of fuel-consuming equipment.

Noise (See Section 4.14)

The DEIR/EIS examines the effects of project-generated noise on "sensitive receptors", such as residential areas, schools and churches. Most of the sensitive receptors in the project area are located in Healdsburg.

Operations at the Healdsburg Bendway site under Alternatives 2 and 3 would be expected to create noise levels which may exceed levels considered "acceptable" under Healdsburg City Ordinances. For the most part, these effects would last from 7 AM to 3:30 PM, Monday through Friday, whenever mining was underway at the site. Mining at the site is proposed for two seasons, initially, and would occur from September 1 through November 1 only.

Public Health and Safety (See Section 4.15)

Health and safety hazards could occur in several ways. Stream crossings that create riverwide obstructions can upset canoes or trap boaters. Open pits often have steep, unstable slopes, and ponded water can provide breeding habitat for mosquitos, which can be vectors for disease. Hazardous materials, such as fuels, oils or lubricants and solvents are likely to be stored on site.

The spurs proposed for the Healdsburg Bendway under Alternative 2 could create boating hazards when the Healdsburg Dam flashboards are in place.

Hazards from stream crossings, which would be significant under Alternatives 2 and 3, could be reduced by providing portage routes. General safety hazards expected with Alternatives 2 and 3 would be reduced by compliance with applicable state and local laws, regulations and codes. Hazards associated with the spurs at the Healdsburg Bendway could be reduced by posting warning signs indicating the location and depth of each spur.

Socioeconomic Concerns (See Section 4.16)

Alternatives 2 and 3 could have a beneficial impact on the City of Healdsburg by providing job opportunities in mining and reclamation. At the same time, the value of property adjacent to the site may decrease because of the proximity of mining and reclamation activities. Because many factors contribute to property values, the effects of the alternatives cannot be quantified, and there are no mitigation measures available.

Other CEQA and NEPA Considerations for the Healdsburg Bendway Site

Unavoidable Significant Impacts

Most of the impacts associated with operations at the Healdsburg Site that are considered significant under CEQA and NEPA could be reduced to less-than-significant levels by implementing the mitigation measures identified in this EIR/EIS. However, some impacts are unmitigable. For both Alternatives 2 and 3, these include:

- Increased accumulated sediment budget deficit
- Bed degradation leading to increased bank erosion
- Reduced transit time for groundwater flow
- Reduced productivity for private wells
- Altered views of the project area
- Conflicts with the Healdsburg General Plan
- Changes in the recreational value of the river
- Cumulative reductions in regional air quality
- Unacceptable noise levels around the Healdsburg Bendway site
- Reduced property values on adjacent lands

In some instances, the Draft EIR/EIS identifies mitigation measures that could reduce the severity of these impacts, but not to a less-than-significant level.

Significant Irreversible Effects

Under CEQA and NEPA, an EIR must analyze the extent to which a plan's primary and secondary effects would commit resources to uses that future generations will probably be unable to reverse [CEQA Guidelines Section 15126(f) and 15127, and CEQA Section 21000(f); NEPA 40 CFR §1502.16].

Different forms of aggregate mining have different levels of replenishment, so the degree to which the effects of mining are irreversible depends on the type, amount and location of mining. Instream mining is far more likely to be a renewable activity than terrace mining. Every winter the river's flow increases, bringing with it gravel, which is deposited in the channel and on adjacent gravel bars. So long as instream extraction does not exceed replenishment repeatedly, the river should continue to be a source of aggregate.

Relationship Between Local Short-Term Uses and Long-Term Productivity

CEQA requires that an EIR include an analysis of impacts that would tend to "narrow the range of beneficial environmental uses or pose long-term risks to public health and safety" [CEQA Guidelines Section 15126(e); CEQA Section 21100(e)]. NEPA requires that EISs evaluate the relationship between short-term uses of the environment and enhancement of long-term productivity (NEPA 40 CFR §1502.16).

The short-term use of the project site is the production of a local, relatively inexpensive source of gravel for the construction of the homes and infrastructure necessary to support the City's and County's existing and future populations. To the extent that it can cause the river bed to degrade, in-stream mining can result in long-term destabilization of dams and bridges and reduced groundwater recharge, as well as long-term degradation of fisheries.

Environmentally Superior Preferred Alternative for the Healdsburg Bendway Site

Based on the impact evaluation presented in Section 4 of this Draft EIR/EIS, the "Environmentally Superior Preferred Alternative" was determined to be the No Project Alternative. The Floodplain Skimming/Streamway Development Alternative (Alternative 5) was found to be environmentally superior to each of the other three alternatives. For the Healdsburg Bendway, Alternative 3 would have less severe impacts than Alternative 2. Only Alternatives 2 and 3 propose mining at Healdsburg Bendway. Alternative 4 may allow mining at the Bendway site at some future date depending on the results of a proposed ongoing mitigation monitoring program.

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance					Mitigation Measure		Level of Significance After Mitigation				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4.2 GEOLOGY AND SOILS													
4.2-1 (H)	Gravel extraction from river terraces and bars creates pits which increase the potential for side slope instability.	LS	S	S	S	S	4.2-1	All slopes shall comply with slope gradient and slope stability requirements in the Sonoma County ARM Plan. Slopes measuring greater than 1 to 1 (horizontal to vertical) shall be analyzed by a Registered Geotechnical Engineer or Certified Engineering Geologist for stability.	N/A	LS	LS	LS	LS
4.2-2	Gravel extraction from the deep pit at the Doyle site could increase the potential for slope instability.	LS	S	S	S	LS	4.2-2	Implement Mitigation Measure 4.2-1.	N/A	LS	LS	LS	N/A
4.2-3	Accelerated erosion of overburden topsoil removed from the Doyle site could occur during gravel extraction operations.	LS	S	S	S	LS	4.2-3(a)	Erosion control measures shall comply with the recommendations and standards of the Sonoma County Surface Mining and Reclamation Ordinance.	N/A	LS	LS	LS	N/A
							4.2-3(b)	Overburden topsoil that is removed shall be placed behind existing berms on the Doyle site.					
							4.2-3(c)	A sediment detention pond shall be constructed to collect potentially eroded topsoil at the Doyle site.					
4.2-4 (H)	Workers could be exposed to seismically induced hazards on the project site.	LS	S	S	S	S	4.2-4	Implement Mitigation Measure 4.2-1.	N/A	LS	LS	LS	LS
4.3 HYDROLOGY AND CHANNEL DYNAMICS													
4.3-1 (H)	Gravel extraction would cause and/or accelerate channel bed degradation below the Healdsburg Dam.	LS	SU	SU	LS	LS	4.3-1	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A
4.3-2 (H)	Increased bed degradation could affect the structural stability stability of bridges and the Healdsburg Dam.	LS	S	S	LS	LS	4.3-2(a)	Modify the Highway 101 and Westside Road bridges so that they maintain structural stability in light of anticipated channel bed degradation.	N/A	LS	LS	N/A	N/A
							4.3-2(b)	The proponent shall pay to install sheet piling around the affected support pier footings and abutments, to a depth that exceeds the potential depth of scour during a design flood, or use other proven measures to stabilize the West Side Bridge.					
4.3-3	Degradation could destabilize channel banks causing loss of floodplain property between the Riverbend site and the bedrock control at the USGS Bellbache gage (river mile 35).	LS	SU	SU	LS	LS	4.3-3	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A
4.3-4	Bed degradation and the excavation of pools below Healdsburg Dam would steepen the channel banks and reduce their stability, causing increased bank erosion.	LS	SU	SU	LS	LS	4.3-4	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A

LS=Less-than-Significant N/A=Not Applicable B=Beneficial PS=Potentially Significant PSU=Potentially Significant and Unavoidable S=Significant SU=Significant Unavoidable
(H)=Significant Impact for the City of Healdsburg

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Mitigation Measure		Level of Significance After Mitigation Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4.3-5	Excavation of the Doyle Pit below the elevation of the River bed, and subsequent loss of the bank between the river channel and pit due to lateral erosion, could lead to capture of the river channel into the pit, and significant upstream degradation and erosion.	LS	SU	SU	SU	LS	4.3-5	None required for Alternatives 1 and 5. None available for Alternatives 2 through 4.	N/A	SU	SU	SU	N/A
4.3-6	Implementation of some of the alternatives could reduce flood capacity in the river, thereby increasing the extent or depth and severity of flooding above the Healdsburg Dam.	LS	LS	LS	LS	LS	4.3-6	None required.	N/A	N/A	N/A	N/A	N/A
4.3-7	Flood inundation frequency and depth could increase below the Healdsburg Dam.	LS	LS	LS	LS	LS	4.3-7	None required.	N/A	N/A	N/A	N/A	N/A
Cumulative Impact 4.3-8	Instream extraction in the project reach would add to the accumulated sediment budget deficit in the Russian River Basin resulting from instream extraction upstream, and from loss of sediment source areas by damming. This could result in bed degradation downstream and possibly accelerated bank erosion in the project reach and downstream of Wohler Bridge.	LS	SU	SU	LS	LS	4.3-8	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A
Beneficial Impact	Bar skimming arrests point bar building and lateral erosion. Alternatives 2 and 3 would have these benefits; although, it may be offset if bed degradation is induced and bank heights increase.	N/A	B	B	B	N/A	N/A		N/A	N/A	N/A	N/A	N/A
	The benefits of the option for stability of the Healdsburg Bluff are tenuous because the bluff has been stable and in its present configuration since 1952. It has also endured major floods in 1955, 1964, 1983 and 1986.	LS	LS	LS	LS	LS			N/A	N/A	N/A	N/A	N/A
4.4 SURFACE WATER QUALITY													
4.4-1 (H)	Instream extraction within or near the live stream would result in the release and concentration of fine sediments and turbid water during the summer low flow or during the first flows of the winter flood season.	LS	S	LS	LS	LS	4.4-1	The project proponent shall construct a temporary secondary de-silting pond downstream of the extraction area before flow enters the live channel.	N/A	LS	N/A	N/A	N/A

LS=Less-than-Significant N/A=Not Applicable B=Beneficial PS=Potentially Significant PSU=Potentially Significant and Unavoidable S=Significant SU=Significant Unavoidable
(H)=Significant Impact for the City of Healdsburg

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance					Mitigation Measure		Level of Significance After Mitigation				
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4.4-2	Bar skimming removes bar armor or pavement, exposing finer sediments. These finer sediments are more subject to mobilization during smaller floods than the pre-project bed. Therefore, more fine sediment could be released at a lower flow, and the remaining bar sediments may be more easily mobilized during larger floods.	LS	LS	LS	LS	LS	4.4-2	None required.	N/A	N/A	N/A	N/A	N/A
4.5 GROUNDWATER													
4.5-1	Below the Healdsburg Dam, bed degradation would lower the groundwater levels in the alluvial aquifer hydraulically connected to the Russian River, which could increase pumping costs at the Windsor and Dry Creek Municipal supply wells.	LS	S	S	LS	LS	4.5-1	Pumping costs incurred as a result of Alternative 2 or 3 shall be reimbursed by the project proponent.	N/A	LS	LS	N/A	N/A
4.5-2	Channel degradation could cause groundwater levels to drop in the Russian River below Healdsburg Dam and in Dry Creek. Lower water table levels would result in decreased groundwater aquifer storage capacity and possible decrease in production at the Windsor and Dry Creek Municipal Well Fields.	LS	LS	LS	LS	LS	4.5-2	None required.	N/A	N/A	N/A	N/A	N/A
4.5-3	Below Healdsburg Dam, private wells that are shallow or are located in areas where the aquifer is thin (10 to 30 feet saturated aquifer thickness) could lose groundwater production due to a decline in the water table caused by channel degradation.	LS	SU	SU	LS	LS	4.5-3	Where affected wells have not fully penetrated the aquifer, the project proponent shall reimburse the total cost of increasing the depth of any wells shown to be significantly affected by reductions in the water table directly caused by project-related reductions in the streambed elevation. Sonoma County shall retain an independent and objective groundwater expert to review groundwater and river monitoring data, determine the causes of any significant changes and the responsibilities of the project, and recommend appropriate measures to rectify the impacts.	N/A	SU	SU	N/A	N/A
4.5-4 (H)	Pumping lift costs at the Fitch Mountain Well Field could increase during low flow periods when the Healdsburg Dam flashboards are down if the groundwater table is lowered by channel excavation or resultant degradation.	LS	S	S	LS	LS	4.5-4	A monitoring program shall be established to accurately identify project-caused reductions (if any) in groundwater elevations at the Fitch Mountain Well Field. Should such reductions result in an increase in pumping or operational costs for the field, the increase shall be funded by the project proponent.	N/A	LS	LS	N/A	N/A
4.5-5 (H)	Channel excavation and subsequent channel degradation above the Healdsburg Dam could reduce or eliminate groundwater production at private wells upstream of or near the Healdsburg Bondway site.	LS	SU	SU	LS	LS	4.5-5	If the affected well does not fully penetrate the aquifer, it shall be re-drilled and deepened at the expense of the project proponent. A monitoring plan shall be established to identify changes in the river channel before and after the project to relate any degradation caused by the project to declining water table and loss of production.	N/A	SU	SU	N/A	N/A

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SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance					Mitigation Measure		Level of Significance After Mitigation				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4.5-6	Channel excavation at the Healdsburg Bendway and any resultant degradation would reduce the aquifer filtration of water drawn from the riverbed to the well.	LS	LS	LS	LS	LS	4.5-6	None required.	N/A	N/A	N/A	N/A	N/A
4.5-7	Excavation of the channel bed and bar at the Healdsburg Bendway would deepen the channel in the river near the Fitch Mountain Well Field. This could accelerate the deposition of fine sediments which could reduce the permeability of the river bed substrate and reduce production and recharge.	LS	LS	LS	LS	LS	4.5-7	None required.	N/A	N/A	N/A	N/A	N/A
4.5-8	Excavation and reclamation of the Doyle Pit could result in effects on local groundwater supplies and movement.	LS	S	S	S	LS	4.5-8	The project proponent shall retain the lower 10 feet of aquifer in the base of the pit and backfill with graded material, such as gravels and finer sands, to seal the top from fine sediment infiltration. In addition, a 400-foot strip of aquifer shall be retained along the length of the ends of the pit.	N/A	LS	LS	LS	N/A
Cumulative Impact 4.5-9	Pit excavation at the Doyle site would contribute to a reduction in transit time for groundwater flow down the valley, and the time it takes to flush the aquifer if a contaminant were introduced.	LS	SU	SU	SU	LS	4.5-9	Implement Mitigation Measure 4.5-8.	N/A	SU	SU	SU	N/A
Beneficial Impact	Floodplain ("terrace") skimming in Alternative 5 to form a Streamway would re-establish the pre-1950s groundwater regime in local reach by reducing the distance between the ground surface and the groundwater table (Figure 7.13 in Appendix C). This would create more area for riparian growth and reclamation to agricultural uses, and reduce groundwater pumping lifts for wells.	N/A	N/A	N/A	N/A	B	N/A		N/A	N/A	N/A	N/A	N/A
4.6 FISH RESOURCES													
4.6-1 (H)	An increase in the amount of deep pool habitat in the river could increase the vulnerability of outmigrating anadromous fish and Russian River tule perch to predation.	LS	PSU	LS	LS	LS	4.6-1(a)	To determine the effectiveness of the proposed instream, deep pools in providing cool-water habitat for salmonids, created pools shall be monitored. Temperature and dissolved oxygen profiles shall be taken at 3 to 5 cross-sections across each created pool (depending on the size of the pool), with sampling stations being located at one quarter, one half, and three quarters of the distance from the right bank to the left bank and one additional station being collected at the deepest part of the cross-section. Profile measurements shall be collected monthly from June through September to cover the entire period when daily median water temperatures exceed 20° C. This information shall be collected for one dry and one normal flow year	N/A	PSU	N/A	N/A	N/A

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								to allow assessment of how the different flow regimes affect any stratification that might occur. To save time and money, initial measurements for each station can be taken at the surface and the bottom to determine if temperature differences of greater than 2° C exist. If they do not, then stratification has clearly not taken place, and no further measurements are needed at that location. If a temperature differential of 2° C or more does exist, then a complete profile shall be collected at that station. Measurements shall be taken at 1 foot intervals to allow clear delineation of any strata that develop. If cool-water habitat is created, then these cool strata shall be surveyed using snorkeling or scuba techniques to assess whether or not this habitat is being used by juvenile salmonids (the stated purpose for the creation of the pools). If they are using the pools, then the reclamation can be judged a success, and no further action needs to be taken.					
							4.6-1(b)	If juvenile salmonids are not using the cool-water habitat of the pools, then additional mitigation measures will be taken as determined appropriate by the County, including, but not limited to: placement of a variety of cover objects on pool bottoms, and/or implementation of predator control programs. If, during monitoring by a qualified fisheries biologist, lack of cover is determined to be adversely affecting resident fish (especially the Russian River tule perch) or migratory salmonids, a variety of cover objects shall be installed and monitored in subsequent years to see if they are being used. If use of the pools by the target species does not increase, different types of cover shall be tried. If the presence of large predators is determined to be affecting fish populations of concern, cover objects shall be placed to provide small fish refuge areas from predators. If necessary, predator populations shall be controlled through a variety of programs, such as bass tournaments, or selective gill netting.					
4.6-2	Fish could be stranded in isolated areas of the existing stream channel when the channel is dammed and diverted during the excavation of deep pools.	LS	S	LS	LS	LS	4.6-2(a)	Placement of the diversion dam (and therefore the start of instream excavation) shall not begin until after June 1 of each year.	N/A	LS	N/A	N/A	N/A

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							4.3-2(b)	A qualified biologist shall conduct fish rescue operations for game fish and the Russian River tule perch subsequent to the placement of each dam and prior to the commencement of mining. Fish from these rescue operations shall be placed in the river either upstream or downstream of the project area.					
4.6-3 (H)	Bar skimming and pool excavation operations in and adjacent to the Russian River stream channel would result in the removal of riparian vegetation, which could cause a reduction in available cover to adult and young fish, a reduction in the input of terrestrial invertebrates from the streamside, and increases in stream temperature.	LS	S	S	S	LS	4.6-3	Implement Mitigation Measures 4.7-1(a) through (d) and 4.7-7.	N/A	LS	LS	LS	N/A
4.6-4	An increase in fine sediment input to the Russian River could result from the skimming of gravel bars.	LS	LS	LS	LS	LS	4.6-4	None required.	N/A	N/A	N/A	N/A	N/A
4.6-5	An increase in silt input could result from failure of proposed soil stockpiles and dikes at the Doyle terrace mining site.	LS	PS	PS	PS	LS	4.6-5	Implement Mitigation Measure 4.2-3(b).	N/A	LS	LS	LS	N/A
4.6-6 (H)	The elimination of areas of "riffle habitat" and the removal of large substrates (i.e. materials greater than 6 inches in diameter) from bars could adversely affect survival of juvenile fish and the production of aquatic invertebrates.	LS	SU	S	S	LS	4.6-6	With the commencement of skimming operations on a bar not recently excavated, the "armoring" or top layer of gravels shall be skimmed and stockpiled on a designated area of the bar. At the conclusion of the mining season, this material shall be respread on excavated portions of the bar.	N/A	SU	LS	LS	N/A
4.6-7	Removal of suitable spawning gravels from bars and the stream channel could affect the spawning success of Russian River salmonids.	LS	LS	LS	LS	LS	4.6-7	None required.	N/A	N/A	N/A	N/A	N/A
4.6-8	Maintenance of a terrace pit on the Doyle site (Site 1) could entrap migrating salmonids.	SU	SU	SU	SU	SU	4.6-8	None available.	SU	SU	SU	SU	SU
4.6-9 (H)	Construction of temporary river crossings at Sites 2 through 6 could create barriers to the movement of fish and increase sediment input to the river.	LS	S	S	S	LS	4.6-9	Use "railroad flat car" type stream crossings exclusively.	N/A	LS	LS	LS	N/A
<u>Cumulative Impacts</u>													
4.6-10 (H)	The combined effects of increased sedimentation, habitat loss or degradation, stream diversion, pool excavation, and potential stranding caused by reclamation and mining operations proposed for the study area could adversely affect populations of resident and migratory fish species.	LS	SU	S	S	LS	4.6-10	Implement Mitigation Measures 4.6-1 through 4.6-9 for Alternatives 2, 3 and 4. None are required for Alternatives 1 and 5.	N/A	SU	LS	LS	N/A

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4.7 TERRESTRIAL BIOLOGICAL RESOURCES													
4.7-1	Mining and reclamation activities could result in the loss of riparian habitat.	LS	SU	SU	SU	B	4.7-1(a)	Wherever possible, removal of, or damage to, riparian vegetation shall be avoided.	N/A	SU	SU	SU	B
							4.7-1(b)	A comprehensive revegetation plan shall be developed for implementation at the Doyle site. The plan shall be designed to include the following elements: 1) the western and northern margins of the excavated pit shall be reclaimed as riparian forest, using methods that rely as much as possible on natural ecological processes; 2) the southeast margin of the pit shall be reclaimed to riparian habitat and, to the extent possible, a continuous vegetative corridor shall be established between mature riparian forest areas located southeast and north of the site; 3) in at least 5 percent of the finished pit, gravel shoals of 3 to 5 foot depth below the spring water shall be level shall be developed to create aerobic environments in which the fish and invertebrate prey for diving birds will be produced; 4) a minimum of 5 percent of the margin of the pit shall be graded to nearly level grade to produce marsh and riparian forest habitat that will benefit dabbling ducks and marsh birds, as well as providing nursery habitat for fish; 5) a monitoring plan shall be produced and determine whether natural succession at the site is proceeding normally and provide provisions to act if it is not.					
							4.7-1(c)	Stockpiles shall not be placed on areas supporting riparian vegetation.					
							4.7-1(d)	Where established vegetation exists adjacent to the low-flow channel on gravel bars proposed for skimming, a ten-foot buffer zone extending from the edge of the low-flow channel shall be created to protect that vegetation.					
4.7-2 (H)	Mining and reclamation operations could result in the loss of one or more raptor nests.	LS	S	S	S	S	4.7-2(a)	A qualified biologist shall conduct a raptor nest survey each season before road construction or mining commences (in areas that would result in the removal or disturbance of riparian forest) to determine whether any active nests have become established since the 1991 breeding season (when the surveys for this report were conducted). A copy of each survey should be submitted to DFG, USFWS, and the responsible permitting agency.	N/A	LS	LS	LS	LS

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							4.7-2(b)	If an active raptor nest is identified onsite, appropriate mitigation measures shall be developed and implemented in consultation with DFG. It should be noted that DFG requirements are likely to vary for different species.					
							4.7-2(c)	Until an appropriate level of protection and/or mitigation is approved by DFG, a 500-foot buffer shall be maintained between construction activity and the active raptor nest during the construction period.					
							4.7-2(d)	Direct take of active raptor nests shall be avoided by conducting any necessary removal of mature trees containing stick nests between September 15 and February 15. This time period is outside of the breeding season.					
4.7-3 (H)	Mining and reclamation activities could result in the temporary and/or permanent loss of potential breeding habitat of the yellow-breasted chat and yellow warbler.	LS	S	S	S	S	4.7-3	Any riparian habitat that will be disturbed or removed within one year, including habitat within 500 feet of mining or road construction activity, shall be surveyed prior to commencement of mining during the breeding season (April 15 to August 15). Surveys shall be conducted by a qualified biologist using appropriate methodology. If breeding individuals of either species are found, suitable habitat shall be flagged and avoided. A buffer shall be established in consultation with DFG and USFWS.	N/A	LS	LS	LS	LS
4.7-4 (H)	Mining and reclamation activities could result in the loss of individuals, or a population, of red-legged or foothill yellow-legged frogs, and/or the northwestern pond turtle.	LS	S	S	S	LS	4.7-4(a)	Any suitable habitat scheduled to be mined shall be surveyed during the appropriate season by a qualified biologist prior to and within one year of the commencement of mining activity.	N/A	LS	LS	LS	N/A
							4.7-4(b)	If any red-legged frogs, foothill yellow-legged frogs or northwestern pond turtles are found on the site of proposed mining activity, mining activity shall be conducted outside the time when eggs and tadpoles would be present (March-July). If mining were to occur (outside the breeding season) in an area where any of these three species occurred, the area shall be monitored to determine whether the species returned to the mined area. If the species did not return, a mitigation plan shall be developed, in consultation with DFG and USFWS, that may include restoration of habitat and reintroduction of the species.					
4.7-5 (H)	Mining and reclamation operations could result in the loss of population(s) of rare plants; in particular, the Sonoma alopecurus (Alopecurus aequalis var. sonomensis).	LS	S	S	S	S	4.7-5(a)	Prior to any road construction or excavation in areas with riparian, especially riparian scrub, vegetation, the boundaries of the activity shall be clearly flagged and a qualified biologist shall survey the area for Sonoma alopecurus.	N/A	LS	LS	LS	LS

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							4.7-5(b)	If a population of Sonoma alopecurus is found, the population shall be durably fenced and avoided by relocating the road or excavation. If avoidance is not possible, a mitigation and monitoring plan shall be developed by a qualified biologist, subject to the approval by DFG and USFWS.					
4.7-6 (H)	A lowered groundwater table near the river banks below Healdsburg Dam and above the Healdsburg Bendway, caused by channel bed degradation could decrease riparian vegetation regeneration and cover.	LS	PSU	PSU	LS	LS	4.7-6	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	PSU	PSU	N/A	N/A
4.7-7	Bar skimming downstream of Healdsburg Dam could destroy topographic diversity and physical habitat for riparian vegetation and wildlife habitat.	LS	S	S	LS	LS	4.7-7	The area of permanent bar skimming shall be reduced, and portions of each shall be allowed to evolve diverse topography, riparian vegetation and habitat. This would be accomplished by implementing such measures as only skimming the downstream half of gravel bars and preserving vegetation adjacent to the waterline.	N/A	LS	LS	N/A	N/A
Cumulative Impact 4.7-8 (H)	The potential loss of riparian habitat within the project area, when considered with cumulative development, would contribute to the regional loss of riparian habitat.	LS	SU	SU	SU	B	4.7-8	Implement Mitigation Measures 4.7-1(a) through (d).	N/A	SU	SU	SU	B
Beneficial Impact	Floodplain "terrace" skimming in Alternative 5 would create topographic diversity in the channel, thereby providing opportunities for expansion of the riparian vegetation corridor and habitat for wildlife.	N/A	N/A	N/A	N/A	B	N/A		N/A	N/A	N/A	N/A	N/A
Beneficial Impact	Construction of the spurs at the Healdsburg Bendway would expand low floodplain area for fine sediment deposition and growth of riparian vegetation. This would restore conditions that existed in 1945.	N/A	B	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A
4.8 LAND USE													
4.8-1 (H)	Mining and reclamation activities may result in noise, dust, and visual impacts creating nuisances for neighboring residences.	LS	SU	SU	SU	SU	4.8-1	Implement Mitigation Measures 4.14-5(a) and 4.14-5(b) to reduce noise impacts.	N/A	SU	SU	SU	SU
4.8-2	Aggregate extraction and reclamation would occur on county lands currently zoned Primary Agricultural District and Secondary Agricultural District.	LS	LS	LS	LS	S	4.8-2	The County shall make the necessary zoning amendments prior to issuance of a mining permit.	N/A	N/A	N/A	N/A	LS

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4.8-3	Aggregate extraction and reclamation would occur on lands designated Land Intensive Agriculture and Resources and Rural Development by the Sonoma County General Plan.	LS	LS	LS	LS	LS	4.8-3	None required.	N/A	N/A	N/A	N/A	N/A
4.8-4	Limitations set forth in the ARM Plan may be exceeded by proposed mining operations.	LS	LS	LS	LS	S	4.8-4	The County shall update the ARM Plan to allow proposed terrace mining at the Middle Reach site.	N/A	N/A	N/A	N/A	LS
4.8-5 (H)	Proposed mining and reclamation operations may require State Lands Commission permitting.	LS	S	S	S	LS	4.8-5	Should the SLC have jurisdiction over the channel of the Russian River, the project proponent shall obtain the necessary permits, leases or entitlements from the SLC.	N/A	LS	LS	LS	N/A
4.8-6	Reclamation of the Doyle site to agricultural uses may not be successful.	LS	LS	LS	LS	LS	4.8-6	None required.	N/A	N/A	N/A	N/A	N/A
4.8-7	Prime farmland may be lost due to mining and reclamation activities.	LS	LS	LS	LS	SU	4.8-7	None available.	N/A	N/A	N/A	N/A	SU
<u>Cumulative Impacts</u> 4.8-8	Regional reductions in usable Prime Farmland would be exacerbated.	LS	LS	LS	LS	SU	4.8-8	None available.	N/A	N/A	N/A	N/A	SU
4.9 VISUAL QUALITY													
4.9-1 (H)	Implementation of some of the alternatives would create a negative aesthetic experience for sensitive receptors in and near the City of Healdsburg.	LS	SU	SU	LS	LS	4.9-1	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A
4.9-2	Some of the alternatives would result in negative visual effects for sensitive receptors in rural areas.	LS	SU	SU	SU	SU	4.9-2	None required for Alternative 1. None available for Alternatives 2 through 5.	N/A	SU	SU	SU	SU
4.9-3	Implementation of any of the alternatives would generally support Sonoma County goals and policies related to scenic resources.	LS	LS	LS	LS	LS	4.9-3	None required.	N/A	N/A	N/A	N/A	N/A
4.9-4 (H)	Implementation of some of the alternatives would not promote some of the City of Healdsburg's General Plan goals and policies.	LS	SU	SU	LS	LS	4.9-4	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A
4.9-5	Construction of the spurs at Healdsburg Bendway would alter the visual characteristics of the site.	LS	SU	LS	LS	LS	4.9-5	None required for Alternatives 1, 3, 4 and 5. None available for Alternative 2.	N/A	SU	N/A	N/A	N/A
4.9-6	Implementation of some of the alternatives could affect glare in the project vicinity.	LS	S	S	S	S	4.9-6	The proponent shall ensure that all bare metallic surfaces are painted to minimize reflectance.	N/A	LS	LS	LS	LS

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4.9-7	Implementation of some of the alternatives could affect the amount of night lighting in the project vicinity.	LS	S	S	S	LS	4.9-7(a)	The proponent shall ensure that any equipment-related and overhead light fixtures used in the project area are shaded and directed away from adjacent roadways and residential areas.	N/A	LS	LS	LS	N/A
							4.9-7(b)	The proponent shall ensure that site lighting is only used where necessary for safety and security purposes.					
<u>Cumulative Impact</u> 4.9-8 (H)	Implementation of any of the alternatives, when combined with cumulative development, could affect views in the project vicinity.	LS	SU	SU	SU	SU	4.9-8	None available.	N/A	SU	SU	SU	SU
4.10 RECREATION													
4.10-1 (H)	Public access through the project area via water-borne craft could be restricted.	LS	S	S	S	LS	4.10-1	Temporary in-stream crossings that are otherwise impassible to water-borne craft shall be designed and constructed so that water-borne craft may be portaged around or over the obstruction. Portage locations shall be clearly identifiable by river travellers, and shall include pathways that permit visibility along the haul road by vehicles and equipment, and have banks or shoulders that are sloped gently enough to permit portage by canoes and drift boats. Such crossings shall be inspected regularly by the Sonoma County Regional Park Department to determine the safety and adequacy of the portage locations.	N/A	LS	LS	LS	N/A
4.10-2	Implementation of the alternatives would restrict public access to the Russian River in the vicinity of the project site.	LS	LS	LS	LS	LS	4.10-2	The project proponents shall provide public access to the Russian River at a point downstream of the Healdsburg Veterans Memorial Park which is accessible to vehicles transporting water borne craft. Such public access shall be coordinated through the Sonoma County Regional Park Department, and shall be operated so that project proponent liability is minimized and public access is ensured during periods of peak use. This measure is recommended, but not required, for Alternatives 2 through 5.	N/A	N/A	N/A	N/A	N/A
4.10-3 (H)	Mining operations immediately upstream of the Healdsburg Veterans Memorial Park and the City's Railroad Park may reduce the recreational value of the parks.	LS	LS	LS	LS	LS	4.10-3	None required.	N/A	N/A	N/A	N/A	N/A
4.10-4	Implementation of the alternatives could result in an alteration of the recreational value of the Russian River in the rural areas adjacent to the project area.	LS	SU	SU	SU	LS	4.10-4	None required for Alternatives 1 and 5. None available for Alternatives 2 through 4.	N/A	SU	SU	SU	N/A
4.10-5 (H)	Implementation of the alternatives cold affect the recreational activities of Healdsburg residents and visitors.	LS	SU	SU	LS	LS	4.10-5	None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.	N/A	SU	SU	N/A	N/A

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4.10-6 (H)	Construction of the spans could affect river-related recreational activities.	LS	S	LS	LS	LS	4.10-6	Signs shall be posted warning of the location and depth of the spans.	N/A	LS	N/A	N/A	N/A
Cumulative Impacts 4.10-7 (H)	Mining and reclamation activities could exacerbate existing and future restrictions to the movement of waterborne craft through the project area.	LS	S	S	S	LS	4.10-7	Implement Mitigation Measure 4.10-1.	N/A	LS	LS	LS	N/A
4.11 CULTURAL RESOURCES													
4.11-1	Implementation of the alternatives could affect unknown buried cultural resources along the Russian River.	LS	PS	PS	PS	PS	4.11-1(a)	When Native American archaeological, ethnographic, or spiritual resources are involved, all identification and treatment shall be conducted by qualified archaeologists who are either certified by the Society of Professional Archaeologists (SOPA) or who meet the federal standards as stated in the Code of Federal Regulations (36 C.F.R. 61), and Native American representatives who are approved by the local Native American community as scholars of their cultural traditions. In the event that no such Native American is available, persons who represent tribal governments and/or organizations in the locale in which resources may be affected, shall be consulted. When historic archaeological sites or historic architectural features are involved, all identification and treatment is to be carried out by historical archaeologists or architectural historians, respectively. These individuals will meet either SOPA or 36 C.F.R. 61 requirements.	N/A	LS	LS	LS	LS
							4.11-1(b)	Prior to commencing mining operations at the Doyle or North Levee sites (and the Middle Reach site under Alternative 5), a cultural resources orientation shall be conducted to acquaint project personnel with the nature of cultural resources potentially present; the potential significance of these resources to the archaeological, Native American, and historic architectural communities and to the public; and procedures for treatment of the resources when they are found. This orientation shall include a presentation by at least one representative each of the archaeological, Native American, and historical communities, as appropriate.					

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(H)=Significant Impact for the City of Healdsburg

TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance					Mitigation Measure		Level of Significance After Mitigation				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
						4.11-1(c)	The COE archaeologist shall be notified of the date and time of the orientation so that he or she may attend. The project proponent shall develop a written plan for treatment of discovered cultural resources, and submit the plan to the City, County and COE for review prior to the orientation. Based on the orientation presentations and proponent's plan, printed materials shall be distributed to those attending the orientation. Upon the discovery of cultural resources during excavation or associated activities, the shift foreperson shall be immediately notified and shall be responsible for immediately notifying the Planning Department, which shall then notify NWIC, Ya-Ka-Ama, and the COE District Engineer. If the discovery occurs during ground-disturbing activities, all work shall be immediately halted in the vicinity of the find until the County's archaeological and Native American consultants have evaluated the find and mitigated associated impacts. Discovered cultural resources shall be stored in a protected environment to prevent vandalism, damage, or theft, until such time as they are examined by an archaeologist and Native American, as appropriate.					
						4.11-1(d)	All Native American artifacts discovered during aggregate production or processing shall be turned over to the Native American community through Ya-Ka-Ama which shall be responsible for the disposition of these materials. Arrangements for prior study by the archaeological community shall be developed by the County's archaeological consultant and Ya-Ka-Ama prior to the final disposition of the discovered materials. These arrangements shall include time frames for archaeological study and mechanisms for transposing the materials to Ya-Ka-Ama.					
						4.11-1(e)	If human bone or bone of unknown origin is found during aggregate production, all work must stop in the vicinity of the find and the County Coroner, Ya-Ka-Ama, the Planning Department staff, and the COE shall be contacted immediately. If the remains are determined to be Native American, the Coroner shall notify the Native American Heritage Commission who will notify the person it believes to be the most likely descendant. The most likely descendant shall work with the aggregate operator to develop a program for reinterment of the human remains and any associated artifacts. No additional work is to take place within the immediate vicinity of the find until the identified appropriate actions have been carried out.					
						4.11-1(f)	All actions taken to identify, recover, store, process, curate, or reinter archaeological materials and human remains shall be overseen by the Planning Department, in consultation with the COE, with associated expenses born by the proponent.					

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TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Mitigation Measure	Level of Significance After Mitigation Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4.11-2 (H) Within the City of Healdsburg, cultural resources could be uncovered by mining activities.	LS	PS	PS	LS	LS	4.11-2 Implement Mitigation Measure 4.11-1.	N/A	LS	LS	N/A	N/A
Cumulative Impacts As no significant prehistoric or historic sites were located within the project boundaries, cumulative impacts are not identified.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.12 TRAFFIC											
4.12-1 Implementation of one of the alternatives would increase gravel truck traffic on roadways.	S	LS	LS	LS	LS	4.12-1 Sonoma County shall implement an updated Aggregate Resources Management Plan that effectively relies on production of aggregate from sources other than the Middle Reach of the Russian River, and which would help reduce existing and anticipated traffic volumes within the County.	LS	N/A	N/A	N/A	N/A
Cumulative Impact 4.12-2 (H) Implementation of one of the alternatives could add to increasing congestion on regional roadways.	S	LS	LS	LS	LS	4.12-2 Implement Mitigation Measure 4.12-1.	LS	N/A	N/A	N/A	N/A
4.13 AIR QUALITY											
4.13-1 Mining and reclamation operations would cause increases in air pollutant emissions.	LS	S	S	LS	LS	4.13-1(a) The proponent shall schedule the South Levee Haul Road aggregate mining during three different years. One-quarter of the mining would occur during year 1 and the same for year 2. One-half of the mining would occur for year 5.	N/A	LS	LS	N/A	N/A
						4.13-1(b) The proponent shall schedule the South Levee Haul Road aggregate mining during two years, half during year 1 and half during year 2.					
Cumulative Impact 4.13-2 (H) Air pollutant emissions related to reclamation and mining operations would have cumulative effects on local air quality conditions.	PSU	PSU	PSU	PSU	PSU	4.13-2 Unnecessary idling of construction equipment shall be avoided.	PSU	PSU	PSU	PSU	PSU
4.14 NOISE											
4.14-1 Implementation of some of the alternatives would increase noise levels on and around the Doyle site over the entire period of mining.	LS	LS	LS	LS	LS	4.14-1 None required.	N/A	N/A	N/A	N/A	N/A

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TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance					Mitigation Measure		Level of Significance After Mitigation				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
4.14-2	Implementation of some of the alternatives could increase noise levels on and around the South Levee Haul Road site over the entire period of mining.	LS	LS	LS	LS	LS	4.14-2	None required.	N/A	N/A	N/A	N/A	N/A
4.14-3	Implementation of some of the alternatives would increase noise levels on and around the Middle Reach site over the entire period of mining.	LS	LS	LS	LS	LS	4.14-3	None required.	N/A	N/A	N/A	N/A	N/A
4.14-4	Implementation of some of the alternatives would cause increase in noise levels on and around the North Levee site over the entire period of mining.	LS	LS	LS	LS	LS	4.14-4	None required.	N/A	N/A	N/A	N/A	N/A
4.14-5 (H)	Implementation of some of the alternatives would cause increases in noise levels on and around the Healdsburg Bendway site over the entire period of mining.	LS	SU	SU	LS	LS	4.14-5	The contractor shall use mufflers, enclosure panels, or other noise suppression attachments on all equipment as appropriate and turn off equipment when it is not in use.	N/A	SU	SU	N/A	N/A
4.14-6 (H)	Implementation of some of the alternatives would cause increases in noise levels on and around the Riverbend site over the entire period of mining.	LS	SU	SU	LS	LS	4.14-6	Implement Mitigation Measure 4.14-5.	N/A	SU	SU	N/A	N/A
4.15 PUBLIC HEALTH AND SAFETY													
4.15-1 (H)	A public safety hazard would be created by deep, open pits with steep side slopes.	LS	S	S	S	S	4.15-1(a)	The operator shall comply with county requirements that would limit public access onto the site.	N/A	LS	LS	LS	LS
							4.15-1(b)	For terrace operations, side slopes for the pits shall equal 1.5 horizontal to 1 vertical for areas above maximum groundwater level, and 1:1 for areas below maximum groundwater level. For instream operations, cuts in gravel bars at property lines or on the edge of mining activities shall be no steeper than 2 horizontal to 1 vertical in slope.					
4.15-2 (H)	Potential safety hazards to river recreationists and canoeists could occur from temporary instream crossings.	LS	S	S	S	LS	4.15-2	Implement Mitigation Measure 4.10-1, which addresses canoeist safety at temporary stream crossings.	N/A	LS	LS	LS	N/A
4.15-3	A safety hazard to river recreationists could be created from the existing concrete box culvert with water surface drop-off.	LS	S	S	LS	LS	4.15-3	Concrete culverts shall be adequately signed to inform boaters of the potential hazard and identify portage options.	N/A	LS	LS	N/A	N/A
4.15-4 (H)	General safety hazards, as listed below, associated with aggregate mining operations would be created.	LS	S	S	S	S	4.15-4(a)	Operations shall comply with worker safety requirements under Cal OSHA 3203 worker health and safety standards. This includes signage identifying the site health and safety officers.	N/A	LS	LS	LS	LS
							4.15-4(b)	Implement Mitigation Measure 4.15-1.					

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TABLE 2-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact		Level of Significance Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Mitigation Measure		Level of Significance After Mitigation Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
							4.15-4(e)	All operations shall comply with requirements of the Uniform Fire Code, the Uniform Building Code, and all county, federal, and state regulatory requirements.					
4.15-5 (H)	A health hazard could result from ponded water in pits.	S	S	S	S	S	4.15-5	Operations shall follow requirements of the Sonoma County Mosquito Abatement District.	LS	LS	LS	LS	LS
4.15-6 (H)	The spans at the Healdsburg Beadway could create a boating hazard when the dam's flashboards are in place.	LS	S	LS	LS	LS	4.15-6	Implement Mitigation Measure 4.10-6 which requires that signs be posted marking the location and depth of spurs.	N/A	LS	N/A	N/A	N/A
4.15-7	The proposed mining operations would take place within the 100-year floodplain and could expose workers and equipment to flood hazards.	LS	LS	LS	LS	LS	4.15-7	None required.	N/A	N/A	N/A	N/A	N/A
4.15-8	Proposed mining operations could result in hazards to pedestrian and bicyclists associated with truck travel along haul roads.	LS	PS	PS	PS	PS	4.15-8	The project proponent shall post signs indicating the haul road is a private road and is used as a "heavy vehicle route". The language shall be posted in Spanish as well as in English.	N/A	LS	LS	LS	LS
Cumulative Impacts No cumulative impacts on public health and safety are anticipated.													
4.16 SOCIOECONOMIC CONCERNS													
4.16-1 (H)	Implementation of any of the alternatives would result in increased employment activity in the Healdsburg area.	LS	B	B	B	B	4.16-1	None required.	N/A	N/A	N/A	N/A	N/A
4.16-2 (H)	Implementation of the alternatives could result in secondary effects on adjacent land uses, affecting their value and their owner's equity.	LS	PSU	PSU	PSU	PSU	4.16-2	None required for Alternative 1. None available for Alternatives 2 through 5.	N/A	PSU	PSU	PSU	PSU
4.16-3 (H)	Implementation of the alternatives would affect local government revenues through property, sales and use taxes.	LS	LS	LS	LS	LS	4.16-3	None required.	N/A	N/A	N/A	N/A	N/A

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ENDNOTES

1. Hopkirk, J.D., 1979 *The Distribution and Ecology of Fishes Native to the Russian River System with Special Reference to Warm Springs Creek.* Appendix B in: Stewart, S.B., and D.W. Peri, Notes on the Mihilakawna Pomo of Dry Creek. Mimeo suppl. to "The Ethnography of the Dry Creek Pomo." Report of the U.S. Army Corps of Engineers.

2. Ibid.

3. Ibid.

4. Bill Cox, Department of Fish and Game, personal communication, 1991.

5. Messer and Brumbaugh, 1989.

6. EIP Associates. July 31, 1992. *Sonoma County aggregate resources Management Plan and Environmental Impact Report.*

7. Sonoma County. 1981. *Aggregate Resources Management Plan.*

8. *California Statewide Wildlife Habitat Relationships System*. 1990. California's Wildlife Volume III: Mammals. Zeiner D.C., W.F. Laudenslayer, K.E. Mayer, and M. White. eds. California Department of Fish and Game. 407 pp.

9. Jones and Stokes Associates. 1987. *Sliding toward extinction: The State of California's natural heritage*. California Senate Committee on Natural Resources and Wildlife. 105 pp. (p.36)

10. EIP Associates, Op Cit.

11. Hogan, Bronwyn, EIP Associates, personal observation, 1992.

12. California Native Plant Society Inventory.

13. Anadromous fish spend most of their life in the ocean but return to freshwater streams to spawn and rear. In the Russian River, primary anadromous fish species include steelhead trout, chinook and coho salmon, and American shad.

3. DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

3. DESCRIPTION OF THE PROPOSED PROJECT AND ALTERNATIVES

3.1 Project Location

The proposed project is located in and adjacent to the Russian River in and near the City of Healdsburg, Sonoma County, California (see Figure 3-1). The proposed project would involve aggregate mining operations at six sites located along a nine-mile reach of the river beginning just north of Wohler Bridge at river mile (RM) 25, and ending east of the City of Healdsburg at RM 34 (see Figure 3-2). As shown in the figure, the six mining sites are titled: Doyle, South Levee Haul Road, Middle Reach, North Levee, Healdsburg Bendway and Riverbend. The Healdsburg Bendway site is located within the corporate boundaries of Healdsburg, while the remaining sites are within the unincorporated portions of Sonoma County. The map pocket at the back of this document contains an aerial photograph of the entire project area.

The project area lies within a relatively flat valley ranging in width from approximately three-quarters of a mile at the southern end to two miles at Healdsburg. The Russian River in this area has been mined for aggregate for over fifty years. The lands adjacent to the project site are predominately agricultural; however, several terrace mining pits have been developed adjacent to the river channel in the floodplain between Highway 101 and Wohler Bridge. Agricultural use in the area is predominantly vineyards. Narrow stretches of riparian vegetation line the river, which is heavily used for recreational activities, particularly swimming, fishing and canoeing.

3.2 Project Background

The proposed mining sites are owned and would be operated by Syar Industries, which is headquartered in Napa, California. Syar purchased the sites from Basalt Aggregate Co. in 1986. In 1988, the Sonoma County Board of Supervisors determined that, with the purchase of the six sites from Basalt, Syar held "vested" rights to mine aggregate on five of those sites. Vested rights entitle the owner to mine the property without first obtaining a use permit from the County. Vested rights are considered equivalent to a permit under the California Surface Mining and Reclamation Act of 1975 (SMARA), so under SMARA, Syar does not need to have a County use permit approved to be able to operate at its vested sites. However, reclamation plans and any required state and/or federal permits must be approved prior to mining. Mining at the Healdsburg Bendway site, however, will require a conditional use permit from the City.

Syar delivered to the County a reclamation plan for its five vested sites in March, 1988. At the same time, a permit application and reclamation plan for the Healdsburg Bendway site was submitted to the City of Healdsburg. The County selected a firm to prepare a Draft EIR/EIS for use by the County, the City of Healdsburg and the COE.

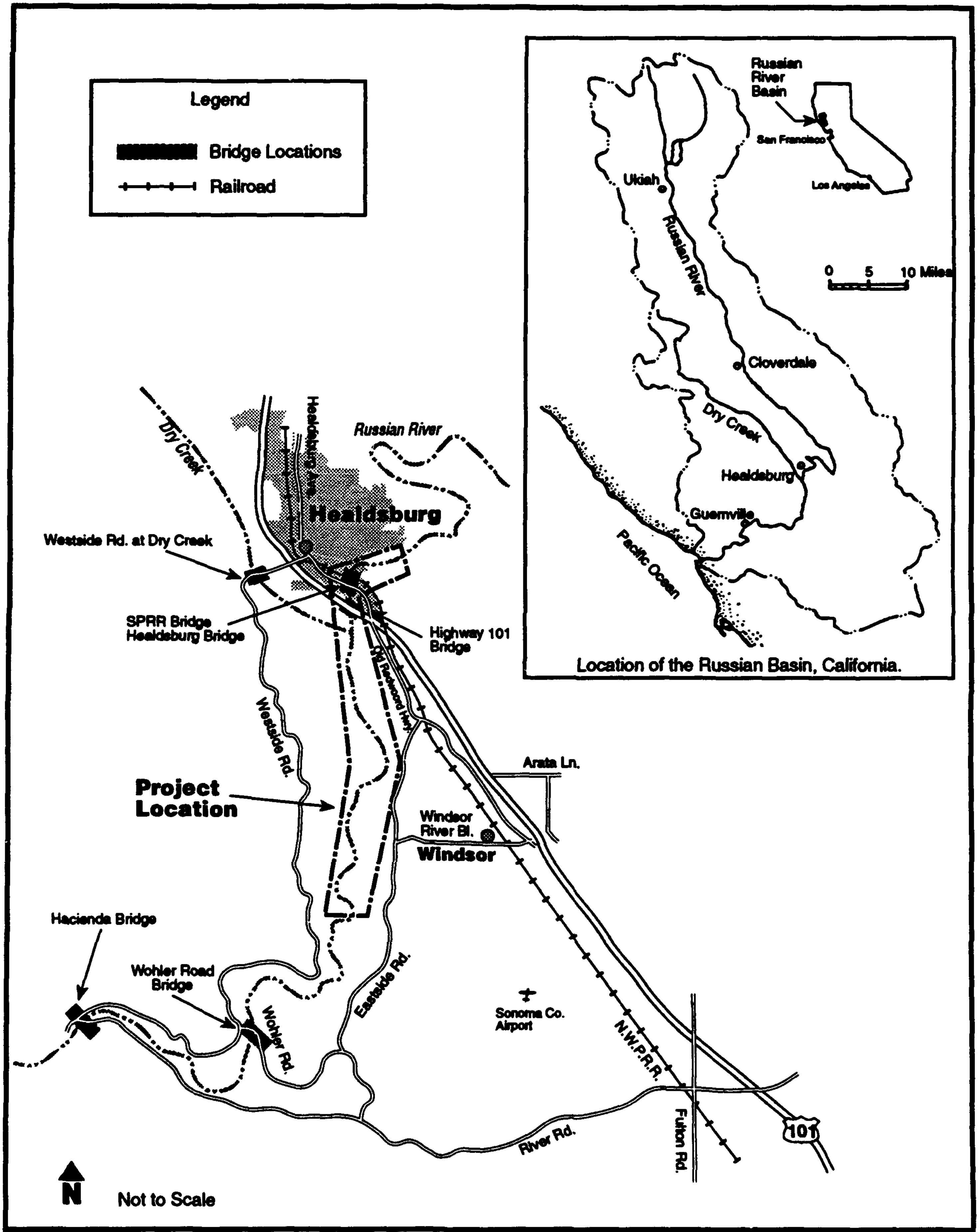

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Figure 3-1
Project Vicinity

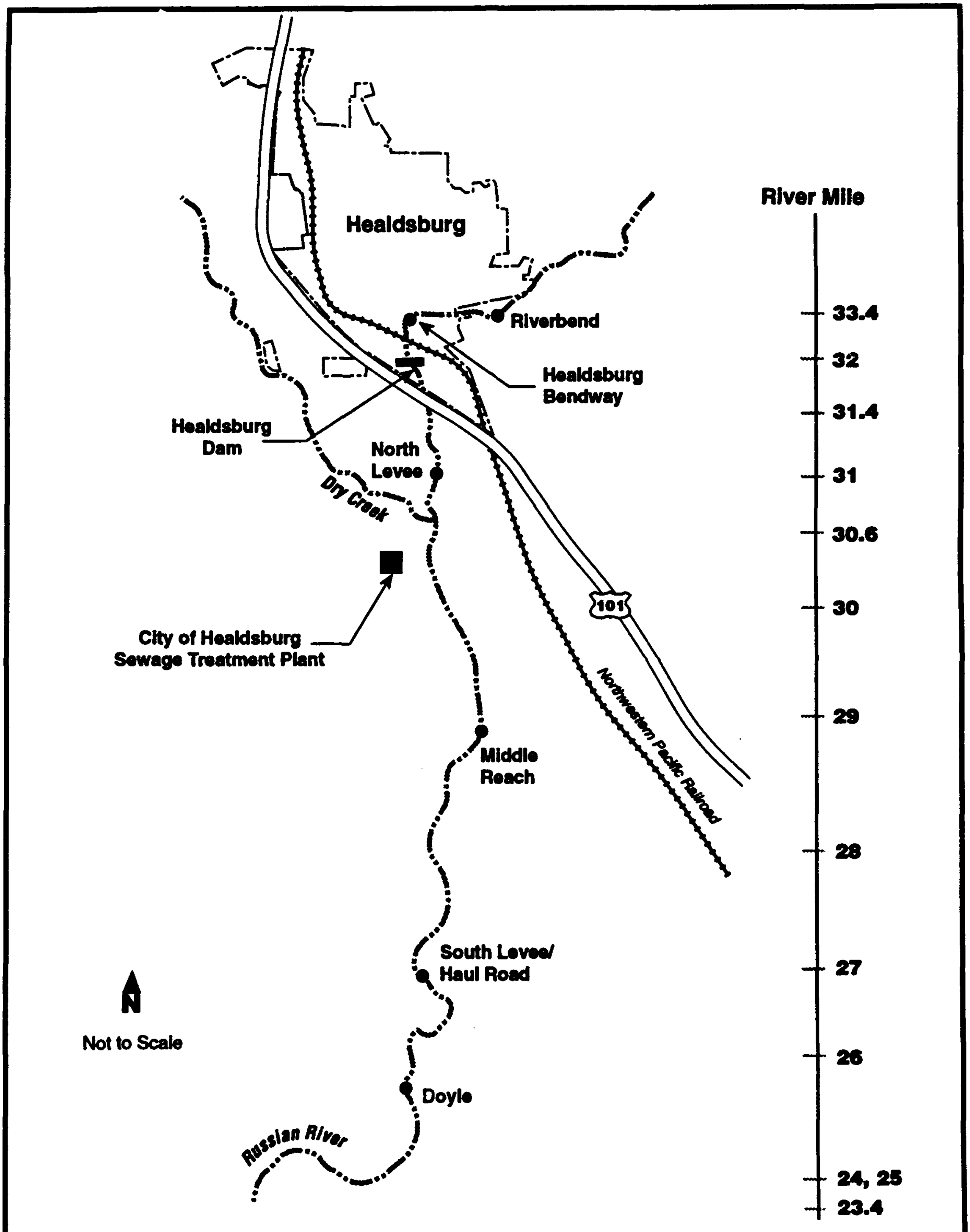


Figure 3-2
Proposed Mining and Reclamations

Under SMARA, if a lead agency has failed to act by July 1, 1990 on a reclamation plan filed by March 31, 1988 for a vested rights operation, the applicant may appeal to the State Mining and Geology Board. The Board may decline to hear an appeal if the Board determines that the appeal raises no substantial issues related to the lead agency's review of the reclamation plan pursuant to the SMARA.

The County did not approve the reclamation plan for the five vested sites within the period delineated by SMARA, so Syar appealed to the State Board of Mining and Geology. Because of the appeal, the County no longer has jurisdiction to approve the reclamation plans, but will be required to enforce provisions of the Plan approved by the Board. The Board determined that an EIR was required. The City of Healdsburg has also determined that an environmental impact report was required for the Healdsburg Bendway permit and reclamation plan. Because the reclamation plans for the six sites are interrelated by proximity and design, the Board and the City have chosen to act jointly as the Lead Agencies under CEQA.

In May, 1989, Syar submitted a permit application for stream crossings and spurs to the US Army Corps of Engineers. At the request of Syar, the COE agreed to prepare an environmental impact statement (EIS). The Board, the City and the COE chose to combine the EIR and EIS into a single document, with the Corps acting as Lead Agency for the EIS.

3.3 Purpose and Need for the Proposed Project

The purposes of the proposed project are to extract aggregate in the vicinity of Syar's Healdsburg processing plant, and to reclaim the mined sites from the Russian River. Aggregate consists of sand and gravel, and is the primary ingredient in concrete, asphalt, road base, trench fill and plaster products used in the construction of roads, dams, canals, homes and commercial structures. Because the expense of aggregate is largely determined by the cost of transportation, a local source is generally considered essential to keeping aggregate affordable. Increased costs for aggregate may substantially affect construction costs for the uses cited above. Aggregate mining, processing and transport generate jobs and revenue for the community and region in which these activities are located. Maintaining the affordability of aggregate will also, indirectly, enhance construction activities within the region. For the mining operator, the project must result in enough aggregate at a price that will cover capital and operating costs and generate a reasonable profit.

The reclamation of the six proposed mining sites is a key element of the proposed project. Reclamation is required under SMARA and is defined as "...the combined process of land treatment that minimizes water degradation, air pollution, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects from surface mining operations, including adverse surface effects incidental to underground mines, so that mined lands are reclaimed to a usable condition which is readily adaptable for alternate land uses and create no danger to public health and safety."

Under SMARA (Section 2770 (g)), Board action is limited to determining whether the reclamation plan under appeal satisfies the requirements of certain sections of SMARA and applicable local ordinances adopted pursuant to SMARA. The Mining and Geology Board has

identified "minimum acceptable practices" for mining and reclamation. Each plan is to include provisions for the following elements:

- Soil erosion control.
- Water quality and watershed control.
- Protection of fish and wildlife habitat.
- Disposal of mine waste rock and overburden.
- Erosion and drainage.
- Resoiling.
- Revegetation.

Ordinance 788 (City of Healdsburg) establishes procedures for the provision, review, and approval of reclamation plans and the issuance of permits to conduct surface mining operations in order to assure that:

a. Adverse environmental effects are prevented or minimized.

b. Residual hazards to the public health and safety are eliminated.

c. Mined lands are reclaimed to a usable condition which is readily adapted to alternative land uses.

d. The production and conservation of minerals are encouraged, while duly considering the values of watershed and flood protection, fish and wildlife, recreation and aesthetic enjoyment.

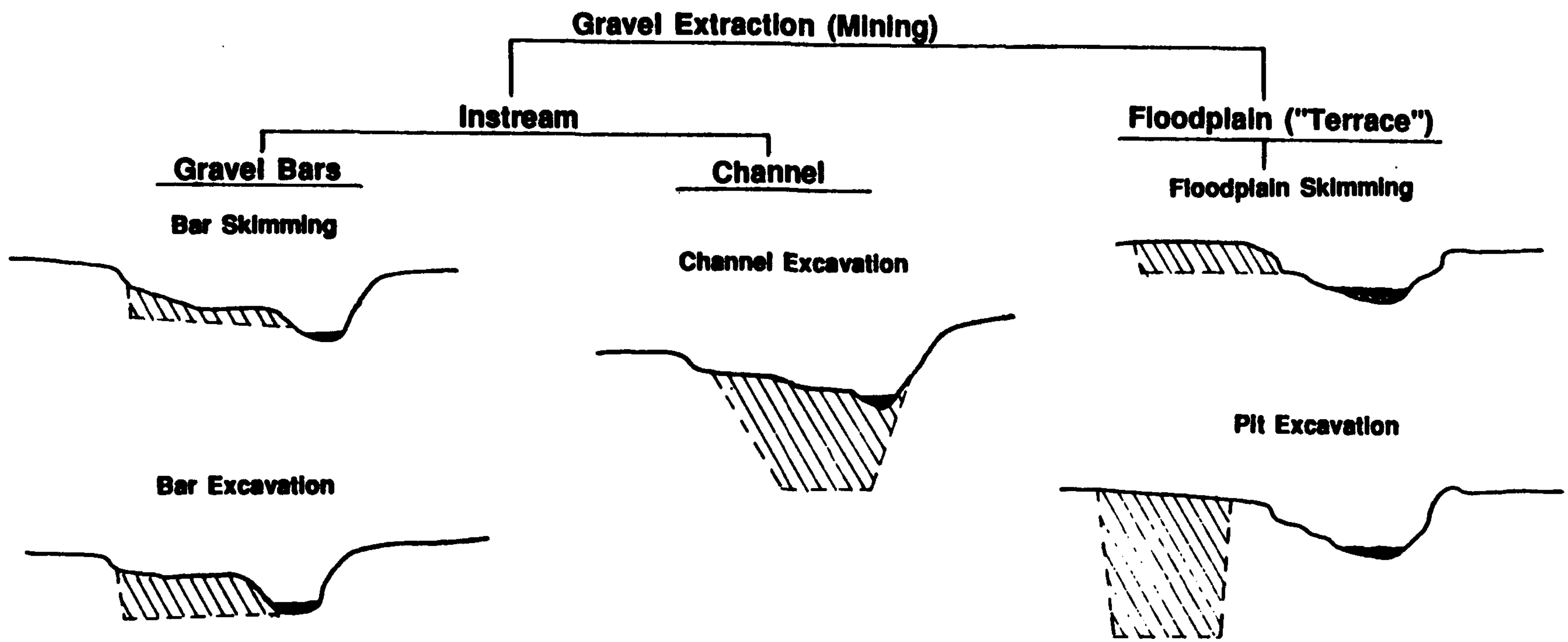
Sonoma County Ordinance No. 3437 Section 26A-7 establishes reclamation plan standards for aggregate mining operations within the jurisdiction of the County. For the five vested mining sites within the jurisdiction of the County, the State Mining and Geology Board will consider the consistency of submitted reclamation plans with the provisions of the County's ordinance in their determination of plan adequacy under SMARA.

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (COE) regulates the placement of dredged or fill material in the waters of the United States. Within the project area, this jurisdiction extends to the ordinary high water level of the Russian River and to adjacent wetlands. Therefore, the COE has regulatory authority over several aspects of the proposed mining and reclamation activities, such as the construction of berms, stockpiles, channel crossings, and bank protection within jurisdictional areas.

3.4 Description of Proposed Project and Alternatives

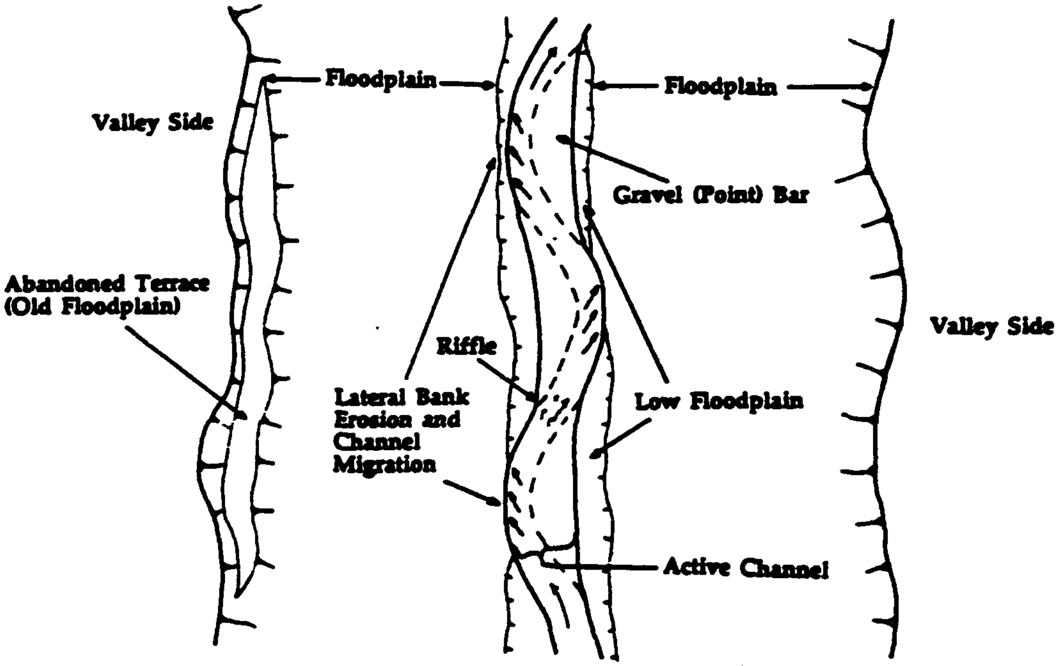
Introduction

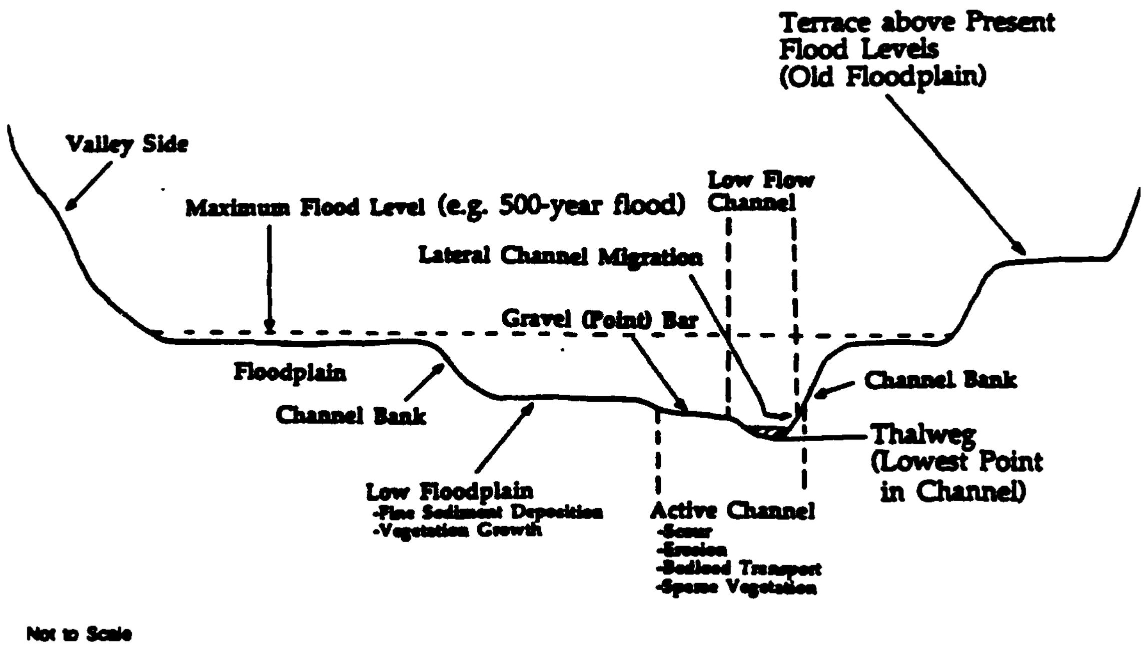
The aggregate extraction operations described in the project and alternatives include bar skimming, channel excavation, and floodplain or "terrace" pit mining. Bar skimming involves removal of sediments by scraping the upper surface of gravel bars using a scraper and/or a front-end loader. Channel excavation involves temporary diversion of the river flow into a channel constructed through an adjoining gravel bar, then dredging of the pool with a line dredger. Floodplain pit mining is carried out by line dredging to depths below the minimum elevation of the Russian River channel (i.e., thalweg). These types of gravel extraction are illustrated in Figure 3-3. Key features of the river and terms found in this EIR/EIS are illustrated in Figure 3-4.



SOURCE: Mitchell Swanson & Associates, 1993.

Figure 3-3
Gravel Extraction Methods and Terminology





SOURCE: Mitchell Swanson & Associates, 1993.

Figure 3-4
River Terminology

As noted above, the proposed project involves the mining and reclamation of six sites along the Russian River. The proposed mining operations for each site and the plans for site reclamation are described below. The descriptions of mining operations associated with the proposed project are based on information provided by the project applicant. Descriptions of the reclamation plans for each of the sites are based exclusively on the plans themselves as originally submitted to the County of Sonoma and the City of Healdsburg. With one exception, no modifications to the plans have been made because, as required by law, the lead agencies must assess the adequacy of the plans as submitted without modification. The description of the Doyle site does differ from the original reclamation plan. In the plan, Syar stated that they would excavate 60 acres, including approximately 15 acres on the west side of the river. Syar has since indicated that it has no intention of mining the west side of the river. Consequently, the EIR/EIS assumes excavation of 45 acres for the Doyle site, all on the east side of the river. Reclamation and mining of the western 15 acres are not considered as part of this EIR/EIS. Should Syar at some future date wish to pursue a reclamation plan for the western Doyle site, additional environmental documentation will need to be developed and approved prior to excavation of that site.

Since submittal of the reclamation plans, the project applicant has indicated its willingness to modify the plans to accommodate various environmental considerations. Where relevant, these potential changes are noted. Additionally, as required by SMARA, the submitted reclamation plans identify potential beneficial uses of the reclaimed project site. These are identified as part of the project description. However, it must be emphasized that these benefits are simply contentions of the project applicant and are unsubstantiated. The EIR/EIS evaluates the effects of the reclamation plan and determines whether or not the project applicants reclamation claims are valid.

In addition to the proposed project (Alternative 2), the EIR/EIS examines several alternatives to the proposed project. In the EIR/EIS, these are identified as No Project (Alternative 1), Gravel Bar Skimming (Alternative 3), Limited Bar Skimming (Alternative 4), and Floodplain Skimming/Streamway Development (Alternative 5). With the exception of the No Project Alternative, each alternative was developed to meet the general project objectives discussed in Section 3.3, above.

Alternative 1: No Project

Under the No Project Alternative, it is assumed that no gravel extraction would occur at the five Russian River sites proposed for instream operations or at the Doyle site. Additionally, reclamation of past operations at Doyle would not occur. Without any instream extraction, the river would dynamically evolve under current geomorphic processes and trends. Below Healdsburg Dam, this would likely lead to a deeper, narrower and more meandering low flow channel with higher, well-vegetated bars. This would lead to an increase in riparian vegetation cover and habitat, more diverse topography on the bars and in the channel, potentially deeper pools, and decreased flood capacity. Lateral erosion of the channel banks would likely increase. Maintenance of bridges, municipal groundwater wells, and uses surrounding the river would continue under present management and adjust as river conditions evolve.

It is assumed that under the No Project Alternative, the temporary overcrossings of Dry Creek (at the confluence of Dry Creek and the Russian River) and the Russian River (just north of Highway 101) would continue to be constructed and removed on an annual basis to serve the

needs of permitted aggregate operations that are not part of the proposed project. It is also assumed that local demand for aggregate will be met through alternate sources including a combination of local terrace mines, Alexander Valley instream sources, and quarry operations within the County.

This Alternative does not meet the objectives of the proposed project as outlined in Section 3.2, Purpose and Need for the Proposed Project, namely provision of a local supply of aggregate, generation of local revenue, creation of local jobs and revenue, and production of a reasonable profit for the mine operator.

Alternative 2: Proposed Project

As noted previously, the proposed project involves mining and reclamation on six potential sites. Table 3-1 summarizes the mining operations on these six sites. The table shows the acreage proposed for excavation at each site, annual tonnage of aggregate vested to the project applicant, initial tonnage proposed for removal at each site, and the operating season at each site. This table is an approximation of expected operations. Since submitting the reclamation plans for each of the proposed sites, the project applicant has indicated that some modification of the acreage presented would be desired. This would involve a reduction in acreage at the Doyle site of 15 acres by eliminating excavation of the west side of the site. This EIR/EIS evaluates only the remaining 45 acres on the east side. In addition, Syar proposed an increase in acres skimmed at the South Levee/Haul Road site from 15 to 20.5, and from 15.6 to 25.8 for North Levee. This EIR/EIS assumes the acreage initially proposed for both sites. In order to mine and reclaim the additional acreage, a new reclamation plan and environmental evaluation would be required.

The following description of Alternative 2 was drawn from the reclamation plans submitted to the State of California by Syar Industries, Inc., with hydrologic analyses and river mechanics reports by Simons & Associates (1987). There are inconsistencies in portions of the reclamation plans, and in the revised drawings and descriptions provided in subsequent discussions with Syar Industries and Simons & Associates. There are also inconsistencies between the reclamation plans and the data in the hydrologic analyses prepared by Simons & Associates. As directed by the State Department of Conservation staff, the EIR/EIS analysis will address the plans officially submitted (with the exception of the Doyle site described above). Inconsistencies are identified in the DEIR text.

For most proposed gravel bar skimming operations, the reclamation plan states that bars will be excavated to 1 foot above low summer flow (lsf). It should be noted that lsf is not a fixed point. If the channel bed degrades, the water level at lsf will drop.

TABLE 3-1
SUMMARY OF PROPOSED MINING OPERATIONS

Site	Excavated Acres	Vested Rights (in tons)	Initial Volume[1]	Type[2]	Schedule[3]
Riverbend	12.97	100,000/yr. to 16' below low summer flow elevation (lsfe)	400,000 tons[4] over 2 years	Channel pool excavation (Bar B) and skimming	9/1 - 11/1 M-F, 7-3:30
Healdsburg Bendway	10.5	Not vested: City Permit Required	75,000 cubic yds/yr.for 2 yrs.[5]	Channel pool excavation and skimming	9/1 - 11/1 M-F, 7-3:30
North Levee	15.6	400,000 to 16' below lsfe	100,000 tons	Skimming	4/15-11/1 M-F 7-3:30
Middle Reach	42.5	120,000 to 16' below lsfe	500,000 tons over 2 to 4 years	Channel pool excavation and skimming	4/1-11/1 M-F 7-3:30
South Levee	15	250,000 to 16' below lsfe	190,000 tons	Skimming	4/15-11/1 M-F 7-3:30
Doyle	45.45[6]	500,000 tons/ year	300,000 tons/yr for 8 yrs.	Terrace	4/1-11/1 6AM-10:30PM M-F 6AM-4:30PM Sat.

[1] Volume of aggregate proposed for removal during mining phase to achieve reclamation plan site configuration.
[2] Proposed mining operation type, i.e.,
Skimming: Excavation of gravel beds above the water level
Channel excavation: Mining of the streambed, in this case, after diverting the river from the existing channel
Terrace mining: Pit excavation of aggregate from terrace areas within the floodplain.
[3] Schedule = proposed operating season and daily time of operation.
[4] Although 400,000 tons exceeds the vested right of 100,000 tons/year, it is the contention of the Project Proponent that Syar's "accumulated vested right" would allow a single year removal of this magnitude.
[5] 101,250 tons/year: 100 lbs per cubic foot; 27 cubic feet per cubic yard; 2,000 lbs/ton.
[6] Originally, 60 acres were proposed for excavation. However, Syar has indicated that the 15 acres on the west side of the river will not be excavated, so this EIR/EIS assumes 45 acres for the Doyle site, all on the east side.

It is difficult to accurately predict the timing and duration of operations at the six proposed sites. Aggregate removal would depend on the "marketability" of the product at any given point in time. This marketability is dependent on several factors, such as demand for the product, quantity and quality of the product available, cost of extraction and processing, and cost of transporting the aggregate. However, a rough estimate of the anticipated phasing and duration of operations at the various sites was prepared by the applicant and is shown in Table 3-2. It should be noted that this schedule accounts for "initial" mining operations only, and does not account for subsequent operations at the proposed instream sites. These subsequent operations are proposed in the proponent's reclamation plan and would involve the removal of aggregate as it aggrades at each of the instream sites. No termination date for these subsequent operations is included in the reclamation plans; however, the applicant has indicated that the termination would occur 50 years after the operations begin.

As shown in Table 3-2, mining would generally take place at two or three of the proposed instream sites during a given season. Work at the Doyle terrace site would be ongoing over a period of approximately eight years. Seasonal operations at the instream sites below Healdsburg Dam would begin in April. Mining at the Healdsburg and Riverbend sites would not begin until after Labor Day (the first Monday of September). All operations for a given season are to be completed, including stream crossings removal, by November 1st of each year. Generally, operations would be conducted from 7 AM to 3:30 PM, Monday through Friday. At the Doyle site, the hours of operation are expected to be 6 AM to 10:30 PM, Monday through Friday, and 6 AM to 4:30 PM on Saturday.

In most cases, a dragline or self-loading scraper would be used to excavate the aggregate. Materials gathered at the Doyle site would be processed on site, except when the processing area is being mined. At that time, approximately 1,200 trips per day would occur on Eastside Road between the Doyle site and the Healdsburg processing plant. For the other operations, material would be carried to the processing plant in Healdsburg, either by the scraper or off-highway trucks which would be loaded by a front-end loader. A maximum of 200 trips (100 loads) to the processing plant would be made each day. Approximately 7,000 tons of material would be carried per day. A water truck would be used for dust control and a motor grader for road maintenance.

Once mining has been terminated at a site, the area would be reclaimed. The project proponent's reclamation plans at each individual site are described below. For channel excavation, native vegetation would be reintroduced through "wattling". This process involves cutting new shoots from a variety of native willows in adjacent areas, wrapping them into bundles and staking them horizontally in the ground on ten-foot centers. The same type of willows would be put in each wattling. As sediments collect, the willows would take root, resulting in more sediment buildup, which would enable other plants to take hold. All plantings would be done in the late fall, at the beginning of the rainy season. Truck watering would be used during extended dry periods.

The following is a discussion of the operations and reclamation plans for the six individual sites assumed under Alternative 2. While reviewing the following section, it would be helpful to the reader to refer to Map 1 (the aerial photo of the entire project reach) supplied in the map pocket at the end of this document. The photo identifies each site and shows them in the context of the entire project area.

TABLE 3-2
INSTREAM EXTRACTION[1]
TENTATIVE SCHEDULE AND PHASING FOR ALL SITES

Season	Instream Extraction (tons/year)	Average Rate (tons/year)
Season 1		
Middle Reach (Partial): April 1 to November 1	125,000-250,000	187,500
Healdsburg Bendway (Partial): September 1 to November 1	50,000	50,000
Total Season One	**175,000-300,000**	**237,500**
Season Two		
Middle Reach South (Partial): April 1 to November 1	125,000-250,000	187,500
Healdsburg Bendway (Partial): September 1 to November 1	50,000	50,000
South Levee Haul Road: April 1 to November 1	190,000	190,000
Total Season Two	**365,000-490,000**	**427,500**
Season Three		
Middle Reach North (Partial): April 1 to November 1	125,000	125,000
North Levee Haul Road: April 1 to November 1	100,000	100,000
Total Season Three	**225,000**	**225,000**
Season Four		
Middle Reach North (Partial): April 1 to November 1	125,000	125,000
Riverbend (Partial): September 1 to November 1	200,000	200,000
Season Four Total	**325,000**	**325,000**
Season Five		
Riverbend (Partial): September 1 to November 1	200,000	200,000
Maintenance Bar Skimming and Pool Excavation at all Instream Sites	Undetermined	--
Season Five Total	**200,000+**	**200,000**
	Range = 175,000 - 490,000 tons/year **Average Annual = 268,000 tons/year**	

[1]Operations at the Doyle site would be ongoing and produce 300,000 tons of aggregate per year.

SOURCE: Syar Industries, personal communication, 1991.

Doyle (Site 1)

As noted above, excavation on the Doyle site would occur within a "terrace" or floodplain area just east of the river channel. This area has been extensively mined in the past and has not been cultivated historically. Two flooded pits currently occupy approximately 20 acres of the project site. According to the reclamation plan, the actual area of excavation would involve approximately 60 acres, including 15 acres on the River's west side. Because Syar has indicated that all mining would occur on the east side of the river, this EIR/EIS assumes only 45 acres will be mined and reclaimed (deepening of the existing pits, and creation of 25 acres of new pit).

The area of excavation, the proposed location of stockpiles and processing facilities, and the project proponent's property boundaries are shown in Figure 3-5. The area consists of old ponds nearly filled with sediment. Approximately 18 acres of riparian habitat would be disturbed by the proposed excavation.

Extraction would be limited to the floodplain exclusively. No extraction is proposed in the river's active channel. The project proponent expects to extract 2.2 to 2.4 million tons at a rate of 300,000 tons per year for eight years. Fine sediments and soils extracted from the pit would be stockpiled for an unspecified period on the narrow east bank of the Russian River. Side slopes above the waterline would be shaped to approximately 1.5 to 1 and below the waterline would be 1 to 1, as shown in the cross-section provided in Figure 3-6.

A processing plant, stockpiles and roads are planned within the site. Stockpiled material would be spread along the bankline between the river and the terrace mining area immediately to the southwest. The reclamation plan submitted by the project applicant contends that this will strengthen the existing bankline. The pit would be dredged to approximately 20 to 30 feet below the minimum elevation of the Russian River channel at the Doyle site. This would be approximately 60 feet below the existing ground surface elevation. At this depth, alluvial aggregate deposits give way to an older formation of "blue clay", illustrated in Figures 3-6 and 3-7.

The reclamation plan further states that materials in stockpiles 1 and 2 would be moved and stored in the area between the river and terrace mining to form a berm. Any additional topsoil would be stored here as well. All topsoil would be salvaged and used in an attempt to strengthen the existing bankline. Fine sediment produced by excavation would be returned immediately to extraction areas where terrace mining has been completed, and would be transported and deposited without intermittent storage. According to the applicant's reclamation plan, a combination of increased depth, reduced velocities, and the relatively large resistance provided by vegetation and the natural terrain would control velocities enough to prevent significant erosion of the stored topsoil and/or berms during flooding. This contention by the project applicant is examined in the Geology Section (4.2) of this DEIR/EIS.

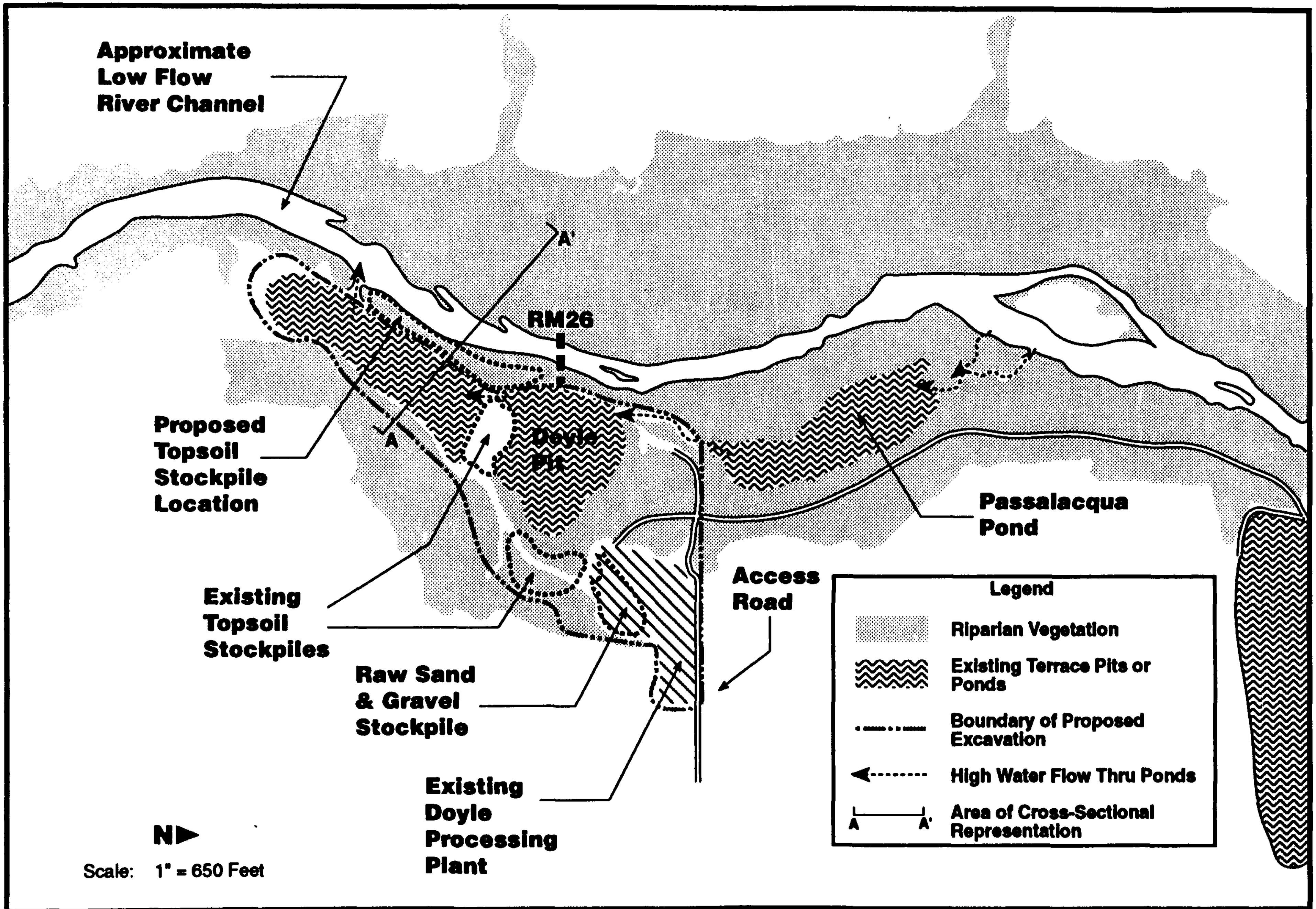


Figure 3-5
Doyle Site
Proposed Terrace Excavation Activities

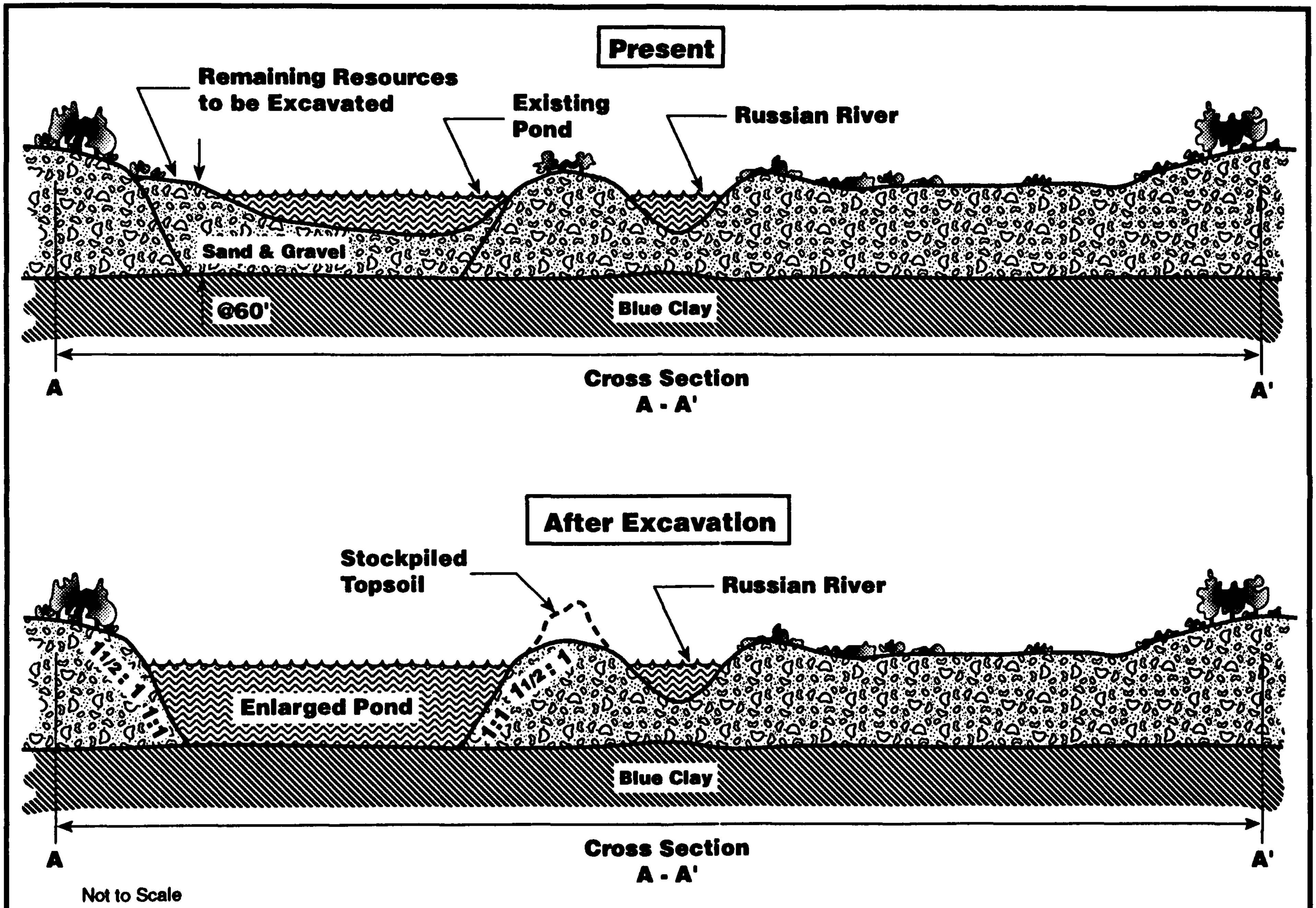


Figure 3-6
Representative Cross Section of the Russian River
Doyle Plant Site

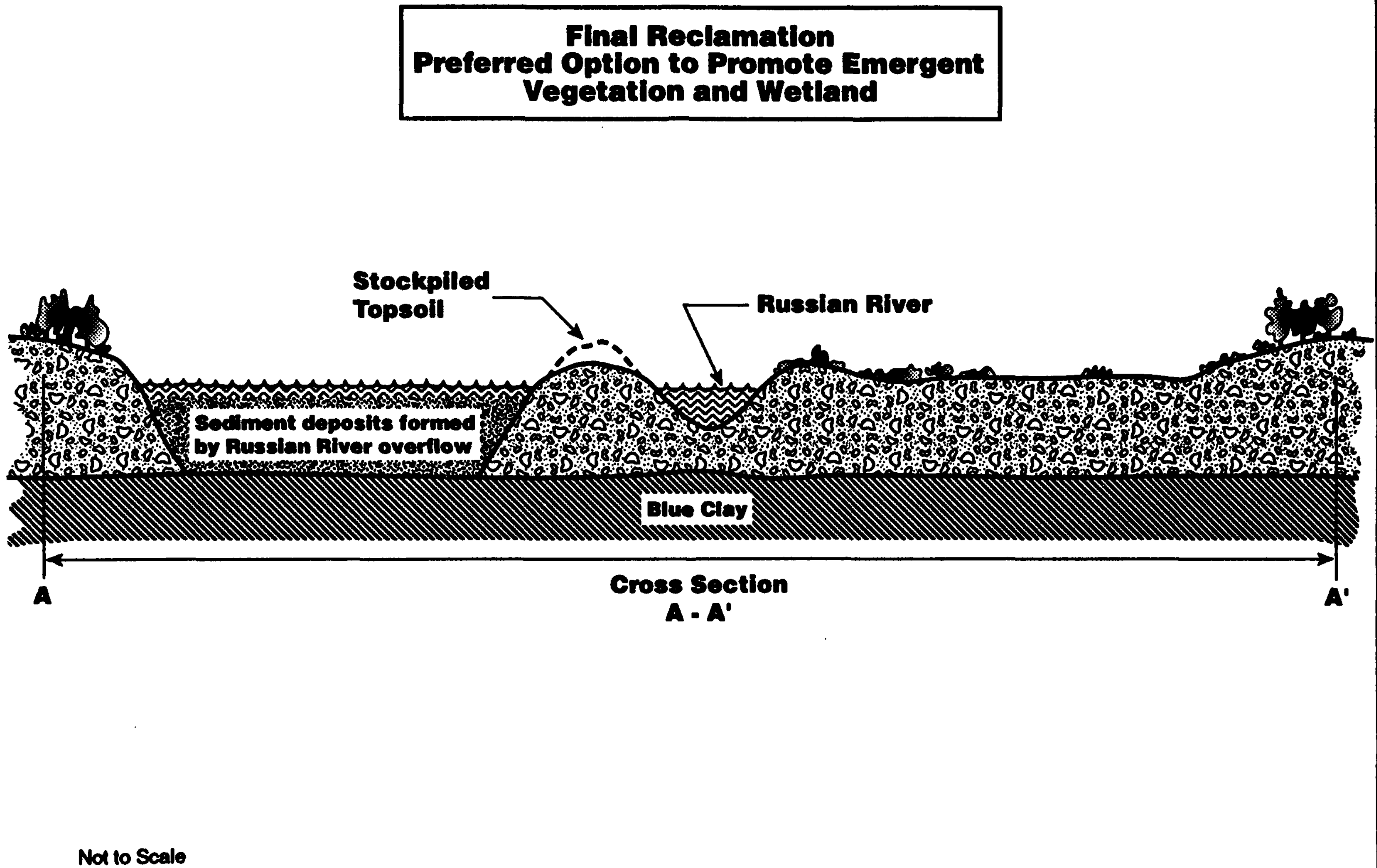


Figure 3-7
Representative Cross Section of the Russian River
Doyle Plant Site

Excavated areas would be linked to the river and would be slowly refilled with sediment as portions of high flows pass through the ponded areas during the process of reclamation. Banks would be maintained, as required, to permit overflow of flood waters into the ponds without breaking. Typically, high water flows would pass through the Passalacqua pit just north of the Doyle pit, flow into the Doyle pit and reenter the river near the southern boundary of the Doyle site (refer to Figure 3-5).

All vegetation, consisting mainly of willows, shrubs and relatively young trees, and topsoil would be removed from excavation areas. The removed vegetation would be mulched and returned to the site or burned.

Pipelines connecting the processing plant and the excavated areas would convey the fine sediments to those portions of the ponds where excavation has been completed. These materials would be used to partially refill the excavated areas.

Extraction operations at the Doyle site would continue for an estimated eight years. According to the reclamation plan, the Doyle pit would then be "naturally" reclaimed by filling with fine sediments deposited by periodic overbank flooding of the Russian River. The amount of time it would take to fill the pit depends on river flow conditions. The fine sediment deposition would be accelerated by connecting a channel to the upstream end of the Passalacqua pit, a low floodplain pit that was abandoned in 1981. The Passalacqua pit has been partially filled with fine sediments (perhaps 50 percent of the extracted original volume) deposited during floods that occurred between 1979 and 1986. The reclamation plan states that after sufficient sediments have accumulated, one of three reclamation alternatives would be pursued: 1) re-excavation, 2) use as wetland habitat or, 3) establishment of agriculture on the reclaimed site. The project applicant prefers reclamation of the site as wetland habitat.

The project applicant is also responsible for Passalacqua Pond, where mining ceased six years ago. According to the project applicant, the pond is being effectively reclaimed by natural processes. The deepest parts of the pond as of March, 1987, were 17 feet deep and accounted for only a portion of the pond. The project proponent concluded that there is little potential for the river to change its course through the pond. High resistance to flow, topography and vegetation would prevent sufficiently large velocities to cause a channel change. Consequently, they believe there is no need for rock rip-rap protection between the north end of the pond and the river. Also, they concluded that natural processes are the best form of reclamation for the pond. This issue is examined in detail in Section 4.3, Hydrology and Channel Dynamics, of this DEIR/EIS.

South Levee Haul Road (Site 2)

The South Levee Haul Road site contains well-vegetated gravel bars and an existing access road. The proposed reclamation plan calls for skimming approximately 15 acres of one bar located in the southern portion of the property (see Figure 3-8). The bar would be skimmed to a level of

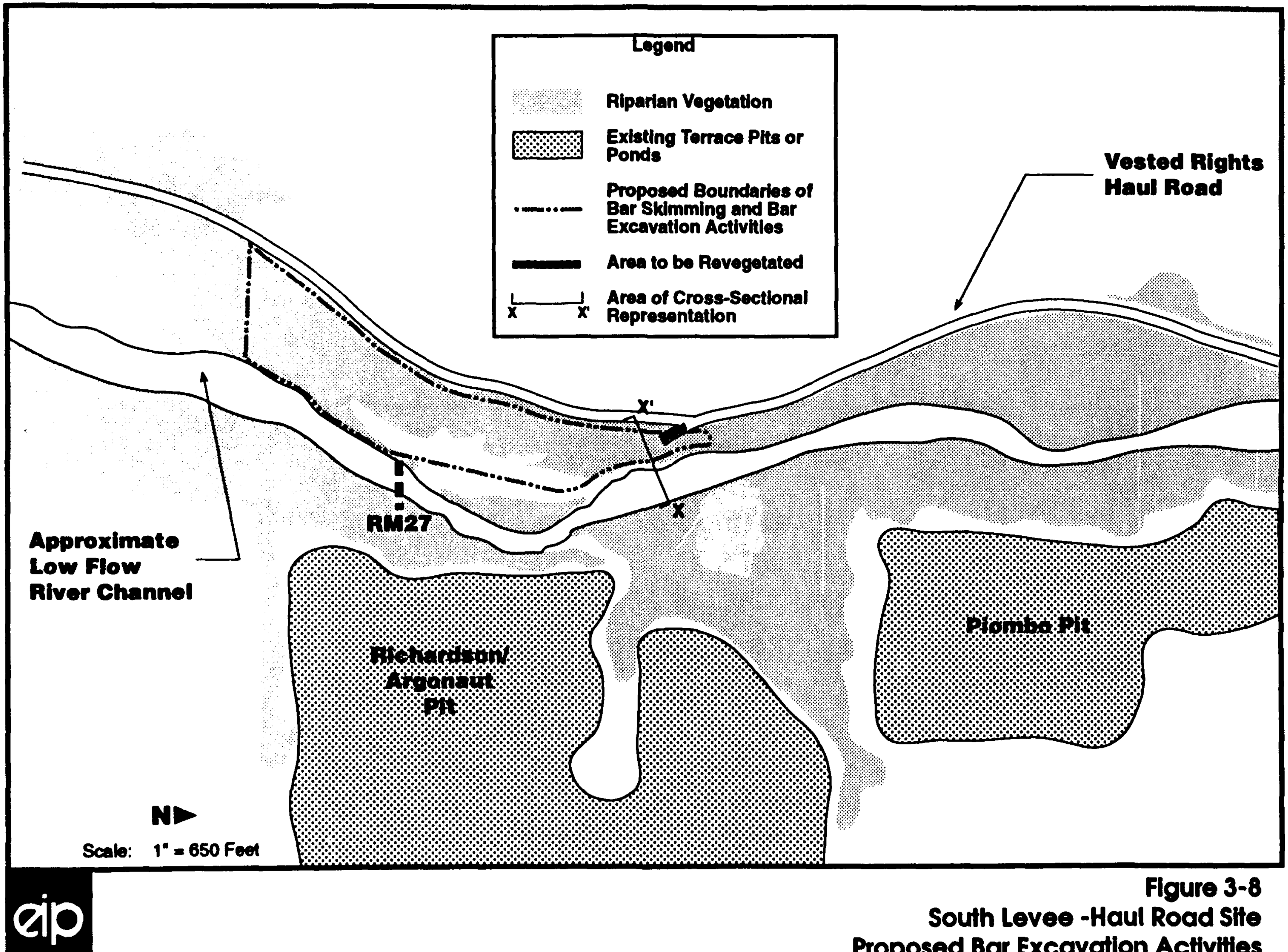


Figure 3-8
South Levee -Haul Road Site
Proposed Bar Excavation Activities

1 foot above summer low water elevation and graded to a minimum slope of 2%. That is to say that from the river channel the skimmed bar would be graded to rise 2 feet for every 100 feet away from the channel (refer to Figure 3-9). Reclaimed slopes and the entire extraction site would be graded and smoothed as necessary to control erosion and present a natural appearance.

Presently there are approximately 13 acres of riparian habitat designated for excavation at the South Levee site. Improvement of the existing haul road and proposed mining operations would require the removal of some vegetation, which would then be burned or chipped into mulch and returned to the site.

Initially, as much as 190,000 tons would be extracted through removal of a 4- to 5-foot layer of gravel. This could be accomplished during a single season. The reclamation plan does not include a termination date for this site; instead bars would be re-excavated after replenishment to its pre-excavation elevation. The applicant has indicated that mining activity would end 50 years after operations begin.

Access roads would be regraded and revegetated within 200 feet of the stream bank when the operation is inactive. If reclamation were required between periods of extraction, two separate access points to the river bed would be revegetated, comprising a surface area of approximately 10,000 square feet.

Middle Reach (Site 3)

The Middle Reach site is located just upstream of the South Levee site and approximately one half mile downstream of the Russian River's confluence with Dry Creek. The site contains four alternating gravel bars. Approximately 9.5 acres of riparian habitat would be disturbed by excavation.

Proposed mining operations at this site would involve excavation of portions of the existing stream channel and gravel bars below the low-flow water surface elevation. Some gravel bar skimming would occur above that elevation. Excavation within the active (flowing) stream channel would be avoided by diverting flows around the area of excavation, using a combination of temporary diversion dams and channels. Additionally, a maximum of four (4) stream crossings would be operational at any given time during mining operations at the Middle Reach site. The locations of these proposed facilities are shown in Figure 3-10. The figure also delineates those areas proposed for excavation or skimming.

The specific location of proposed channel excavations (pool creation) is shown at the bottom of Figure 3-11. As shown in Figure 3-12, the channel would be excavated to a maximum depth of 12 - 16 feet below the elevation of low summer flow. On the gravel bar side of the excavated channel, the bar would be excavated and skimmed to achieve a roughly uniform slope between the bottom of the created pool to the edge of the temporary diversion channel. The slope of this excavation at any given point would vary, depending upon the depth of the channel and distance to the temporary channel. The finished slope on the bar side of the channel would be either 1:1 or 1:1.5.[1] On the riparian side the channel, the maximum finished slope would be roughly 1:1.

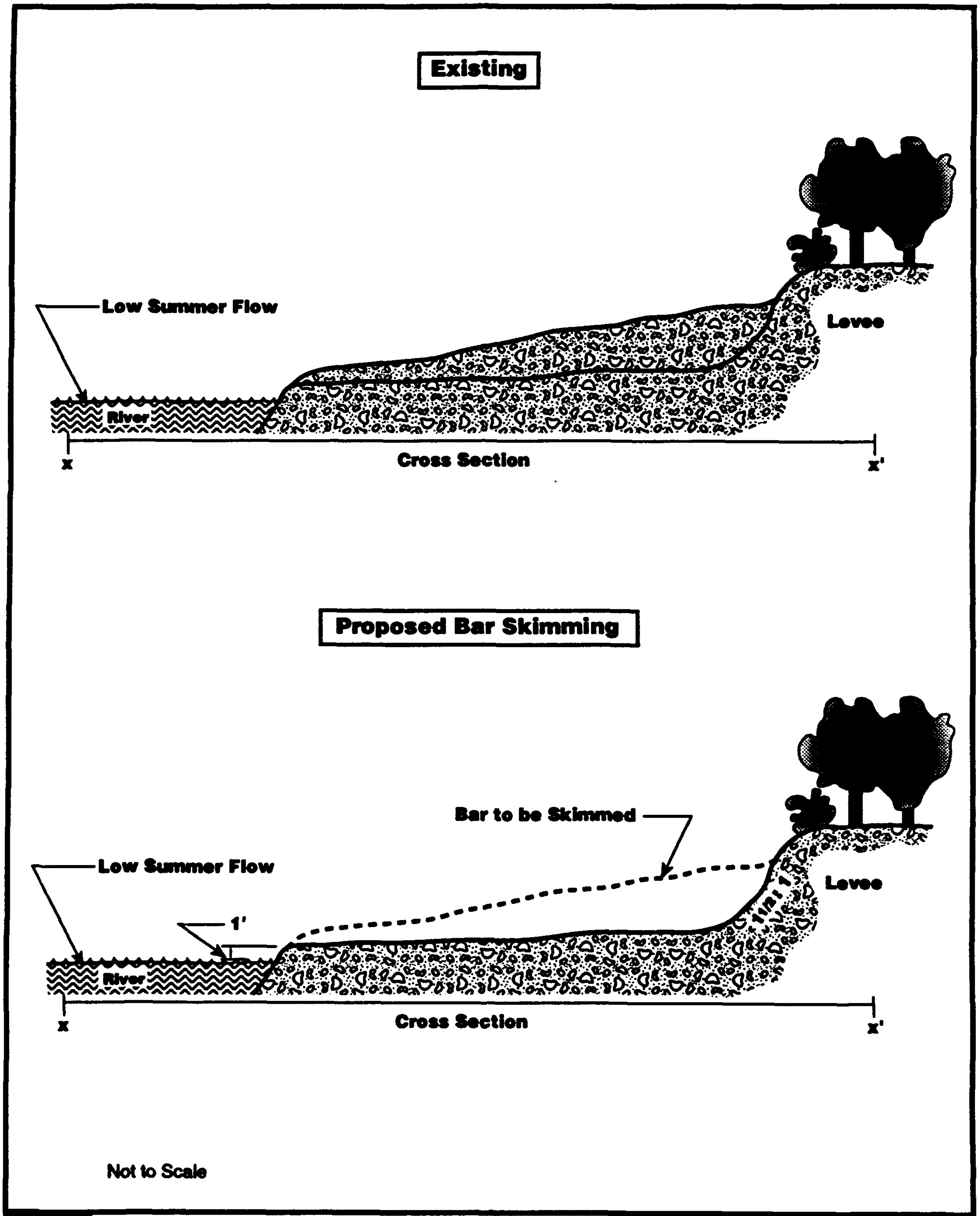


Figure 3-9
Representative Cross Section of the Russian River
South Levee/Haul Road

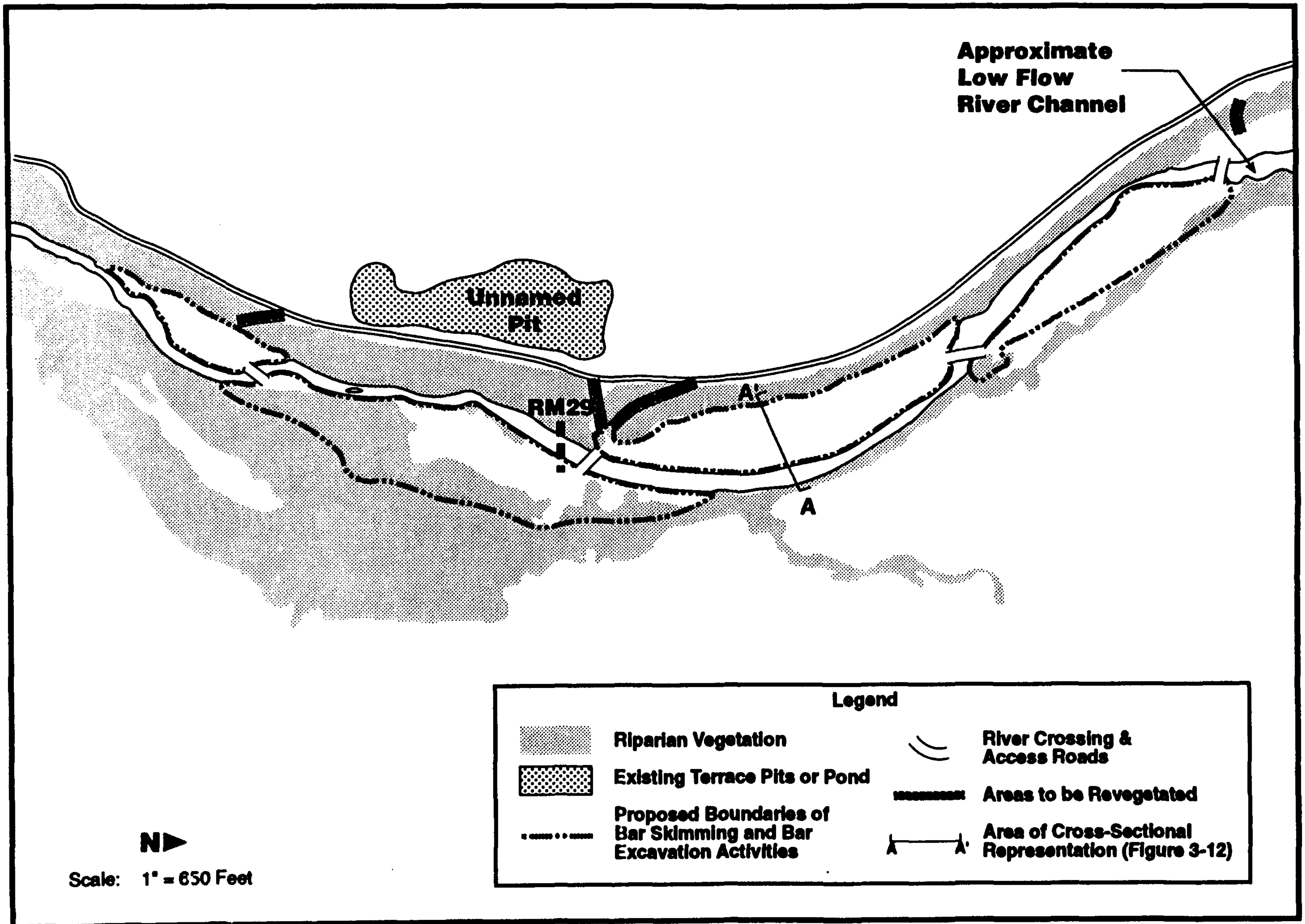


Figure 3-10
Middle Reach Site
Proposed Bar Excavation Boundaries

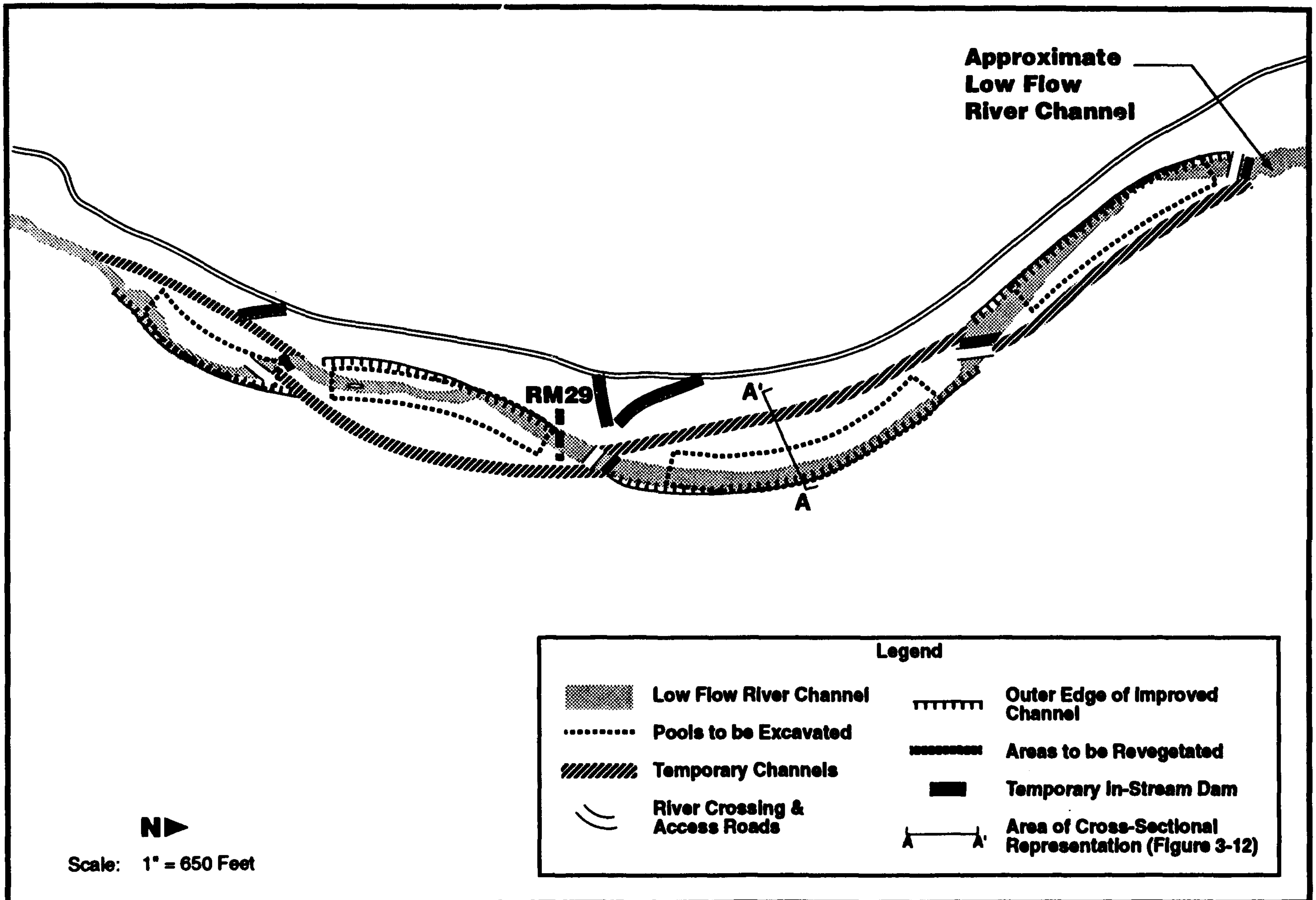


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Figure 3-11
Middle Reach Site
Pool Creation and Temporary Facilities

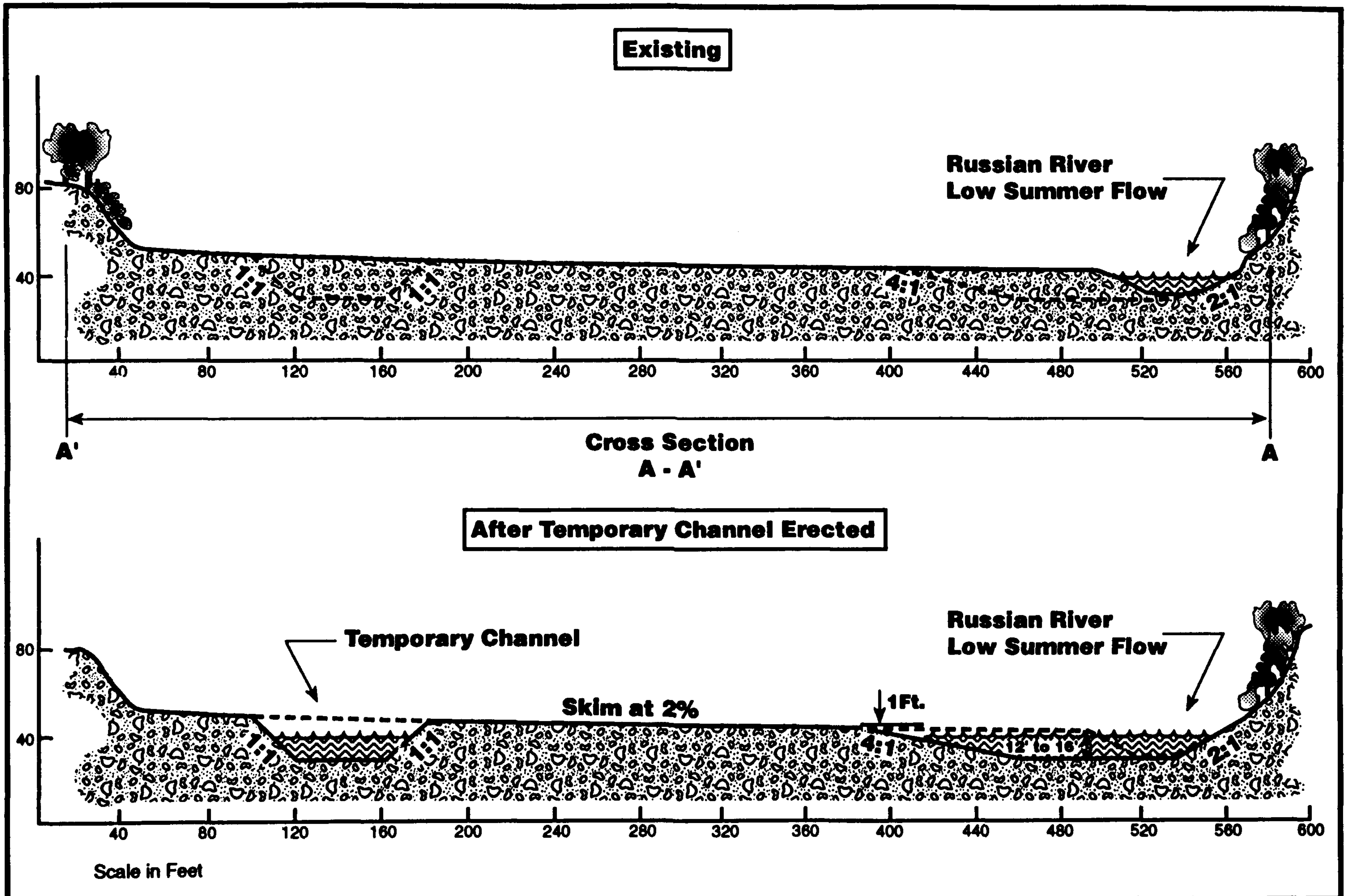

Figure 3-12
Representative Cross Section of Excavated Pool and Temporary Channel
Middle Reach

As noted above, excavation within the active stream channel would be avoided by diverting streamflow out of the existing channel. A temporary dam would be constructed in the active channel, diverting flows through a temporary channel that would cut across the high side of the point bar. The temporary dam would have a base width of approximately 15 to 20 feet, side slopes of 1.5 horizontal to 1 vertical, and an elevation of approximately 2 feet above low summer flow. The diversion channel would be excavated to about 7 feet deep and 50 feet wide with side slopes of about 1.5 horizontal to 1 vertical. Mining operations in the river channel and on the point bar would be conducted during low flow conditions. When stream channel and bar conditions illustrated in Figure 3-12 are achieved at a particular bar, the streambed would be left in this condition. According to the reclamation plan submitted by the project applicant, natural flow would rise in the fall, breach the temporary dam and reoccupy the natural river channel. As flows increase, they would extend landward toward the temporary channel, which would be filled with sediments. Over time, a modified alternate bar would form, consistent with the new geometry of the channel.

Initial excavation of the Middle Reach site would produce a total of approximately 500,000 tons of aggregate over four seasons while the channel and bars are excavated. The reclamation plan submitted by the applicant suggests that some subsequent mining of the area may occur on the site in response to future buildup (replenishment) of aggregate in the excavated pools or on the gravel bars. These subsequent operations would not exceed 120,000 tons/year.

It is anticipated that mining operations at the Middle Reach site would involve excavation of only one (1) bar per season for four seasons. If this were the case, a maximum of one dam and diversion channel would be operational at any given time. Anywhere from one to four temporary stream crossings would be in place at any given time.

Access to the bar at the downstream limit of the Middle Reach site would require the placement of four (4) temporary stream crossings, the next bar up would require three (3), the next two (2), and the upstream bar would require one (1) crossing (refer to Figure 3-11). According to the reclamation plan, each of the river crossings would consist of six to twelve 20-inch by 42-inch steel pipes placed in the river to carry water. The pipe would then be covered with native material to complete the crossing. Upon completion of the annual operations at the site, the river crossings would be removed and flattened.

<u>North Levee (Site 4)</u>

According to the proposed reclamation plan, the North Levee site would involve a skimming operation on approximately 15.6 acres of two gravel bars located just south of the Highway 101 bridge (see Figure 3-13). Almost 2 acres of riparian habitat would be affected by skimming operations.

Approximately four to five feet of the bars on the North Levee site would be skimmed to a maximum depth of one foot above the summer low flow elevation (unfixed). Initially, this is expected to produce approximately 100,000 tons of sand and gravel, which is substantially less than the vested rights for the site, 400,000 tons per year. The final configuration of the mined area is shown in the cross-section in Figure 3-14. Additional mining of the site would occur as

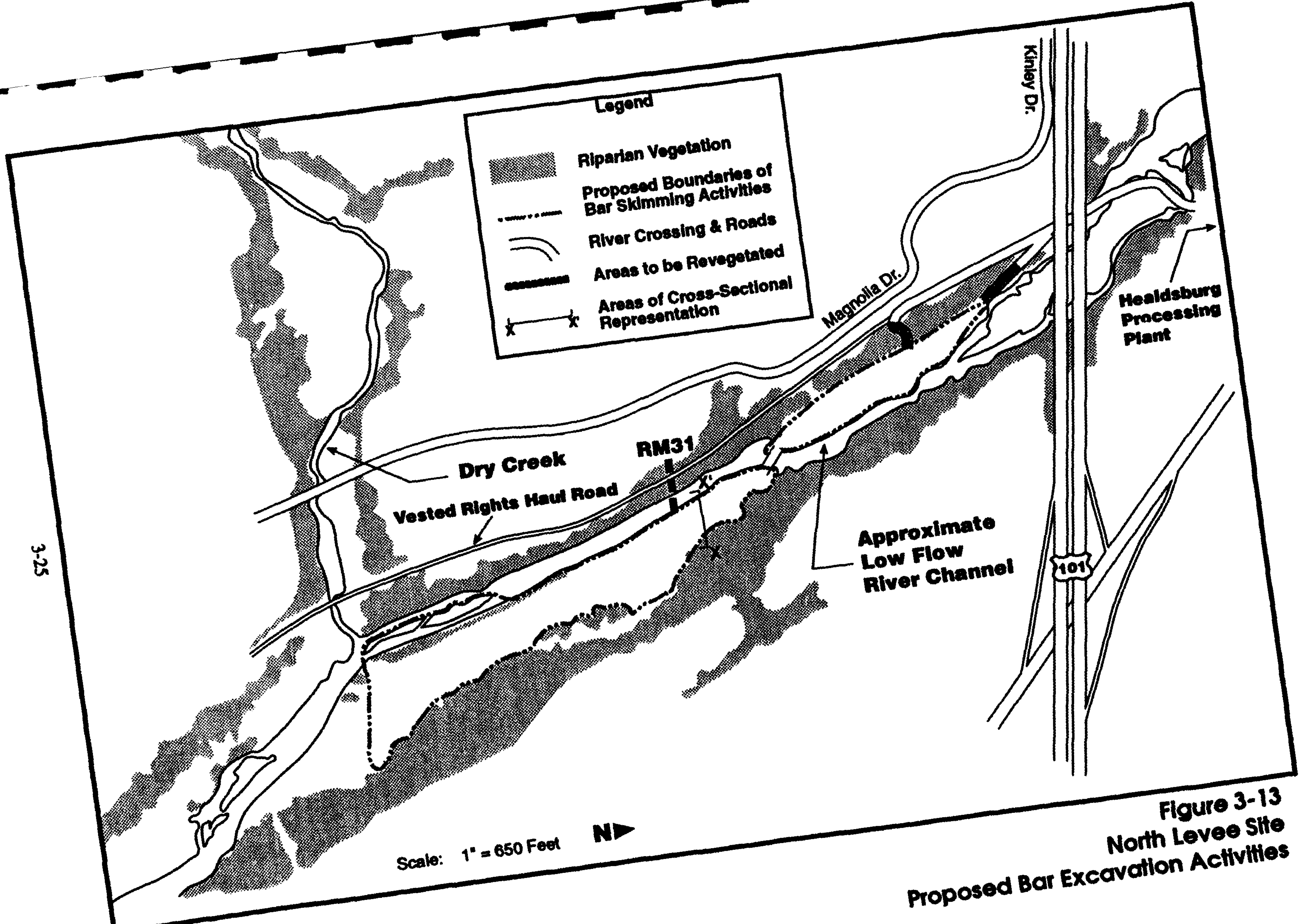

Figure 3-13
North Levee Site
Proposed Bar Excavation Activities

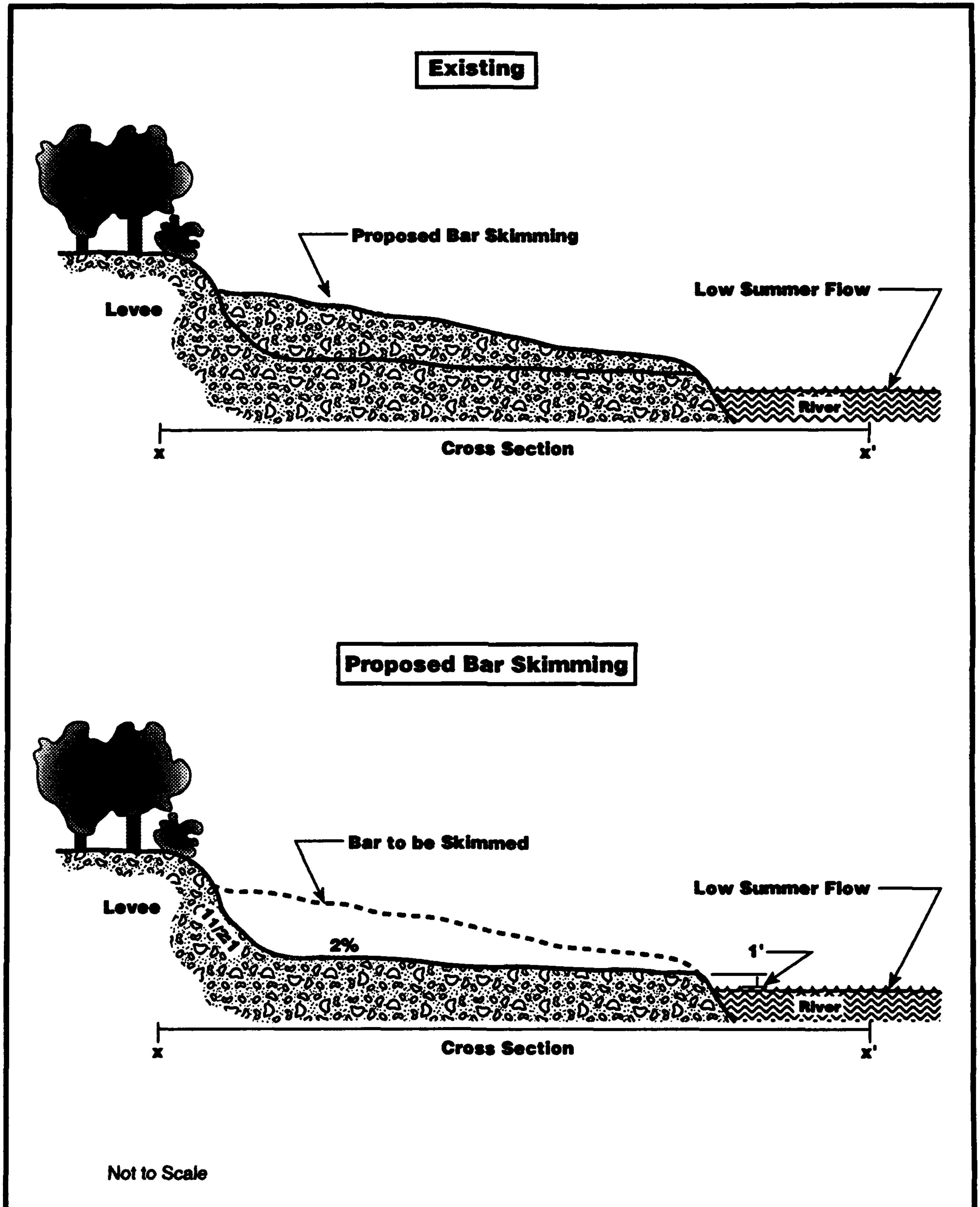

Figure 3-14
Representative Cross Section of the Russian River North Levee

bars are replenished. Future skimming would occur at the rate of replenishment above 1 foot above summer low flow elevation, with a 2 percent grade line from low flow channel to channel bank.

Upon permanent termination of mining, access roads would be regraded and revegetated to within 200 feet of the stream bank. The revegetated area would be about 8,000 square feet. Wattling would be used to establish vegetation. Finished slopes would be graded to 100:2 (H:V). Although required by SMARA, the reclamation plan does not specify a date for permanent termination. However, the applicant has indicated that mining would terminate 50 years after project initiation.

Healdsburg Bendway (Site 5)

The Healdsburg Bendway is a sharp right angle bend in the Russian River adjacent to the City of Healdsburg (see Figure 3-15). Residential uses are located atop a steep bluff which borders the western end of the bendway. A relatively dense band of riparian vegetation occupies the low-lying area adjacent to the outer band of the bend. However, the project is expected to disturb less than one acre of riparian habitat. The Syar Industries processing plant is located on the inside of the bend.

Three gravel bars are located within the Healdsburg site. These are shown as bars A, B, and C in Figure 3-15. According to the reclamation plan submitted by the project applicant, the applicant proposes to excavate Bars A and B to a depth equivalent to the current river bed elevation (see Figure 3-16). Bar C would be excavated to a maximum depth of 16 feet below the current river bed elevation (see Figure 3-17). To accomplish this, approximately 0 to 20 feet of sand and gravel on Bar A would be excavated to reach the present thalweg elevation, which ranges from approximately 62 to 72 feet above mean sea level (msl). Bar B would be mined to the low flow river bank to bluff line. Intermittent mining would be done to maintain Bar C at 16 feet below the bed level. Figures 3-16 and 3-17 provide schematic cross-sections for the three bars. Table 3-2, above, details the mining schedule for this site, with estimates that initial mining would occur over two seasons, and be limited to the period of September 1 to November 1. Excavation would be accomplished using a dragline. Haul units would be used to haul materials to the nearby processing plant.

To facilitate proposed excavation of Bar B, it would be necessary to construct a temporary stream crossing. According to the submitted reclamation plan, this crossing would consist of approximately 6 20-foot lengths of 42-inch diameter steel pipe placed in the river parallel to the direction of flow in order to carry water. The crossing would then be completed by covering the pipes with native materials. The river crossing structure would be removed upon completion of the annual extraction and hauling process. This would occur no later than November 1.

According to the reclamation plan, a total area of 10.5 acres would be excavated at the Healdsburg site, and the annual volume of mined aggregate would average approximately 75,000 cubic yards, or 101,250 tons.

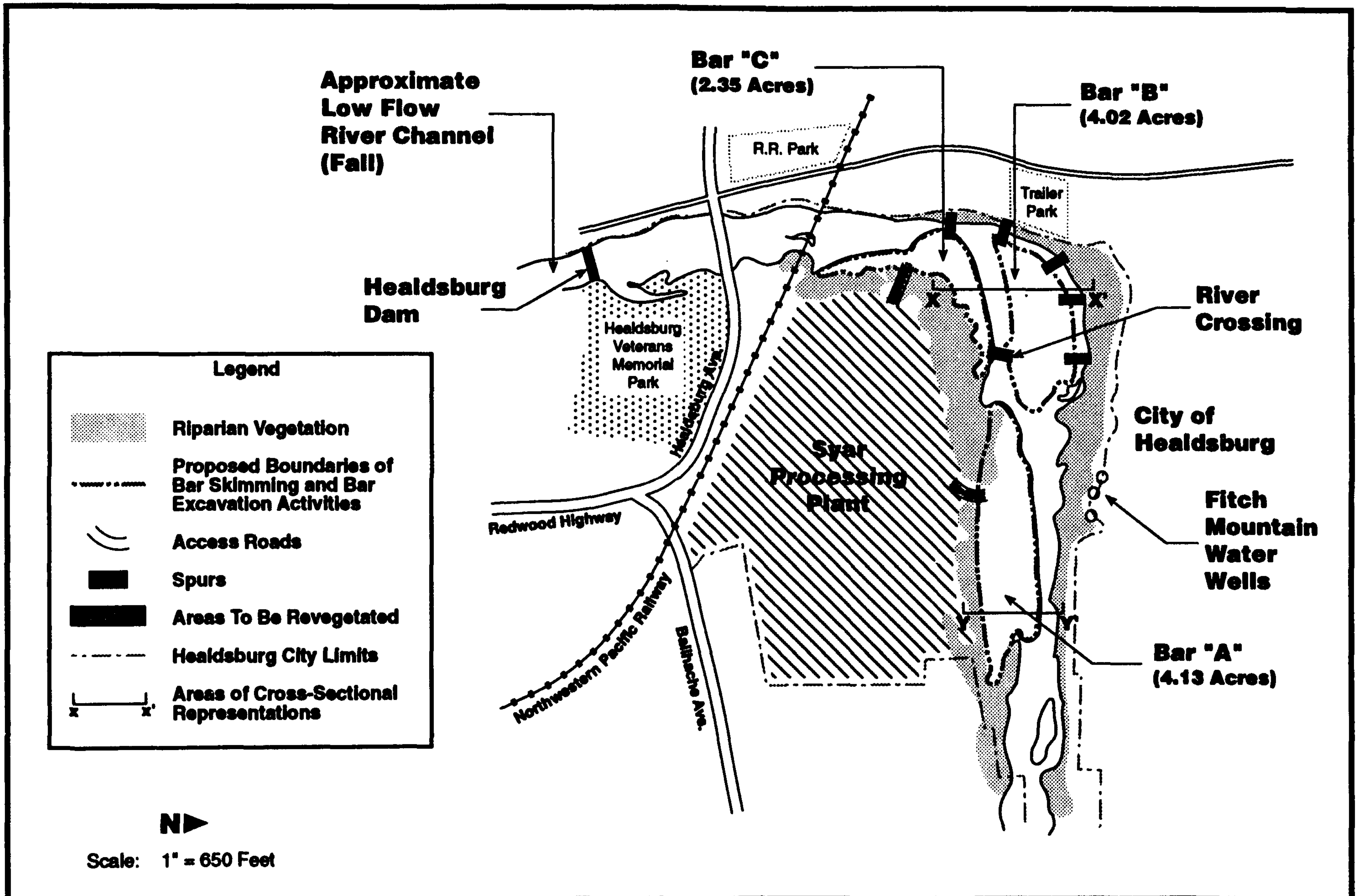

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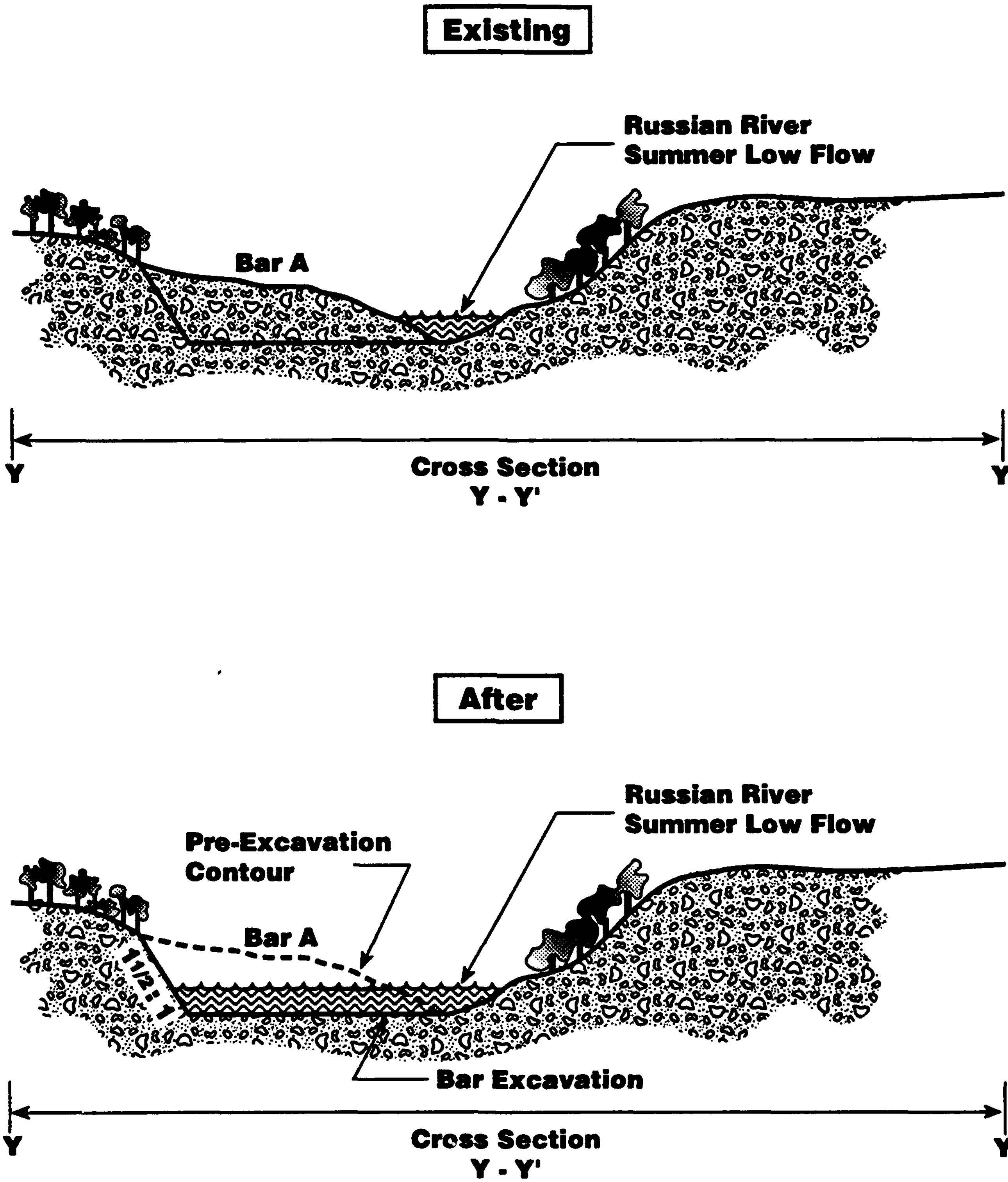
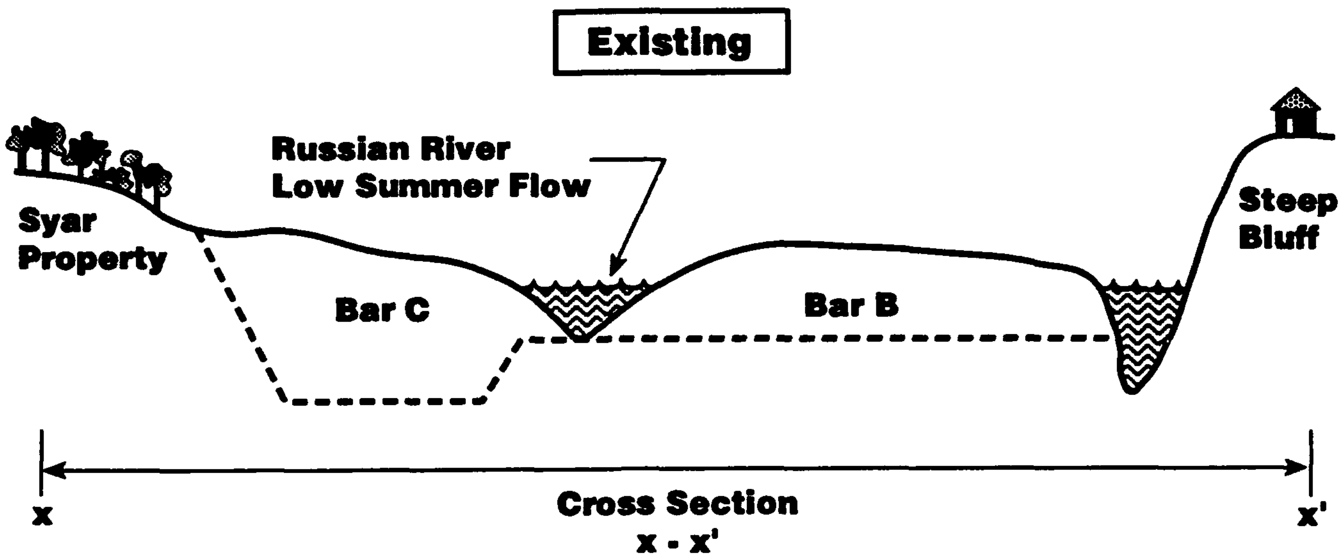
Figure 3-15
Healdsburg Bendway Site
Proposed Bar Excavation Activities



Not to Scale

Figure 3-16
Representative Cross Section of the Russian River
Healdsburg Bendway



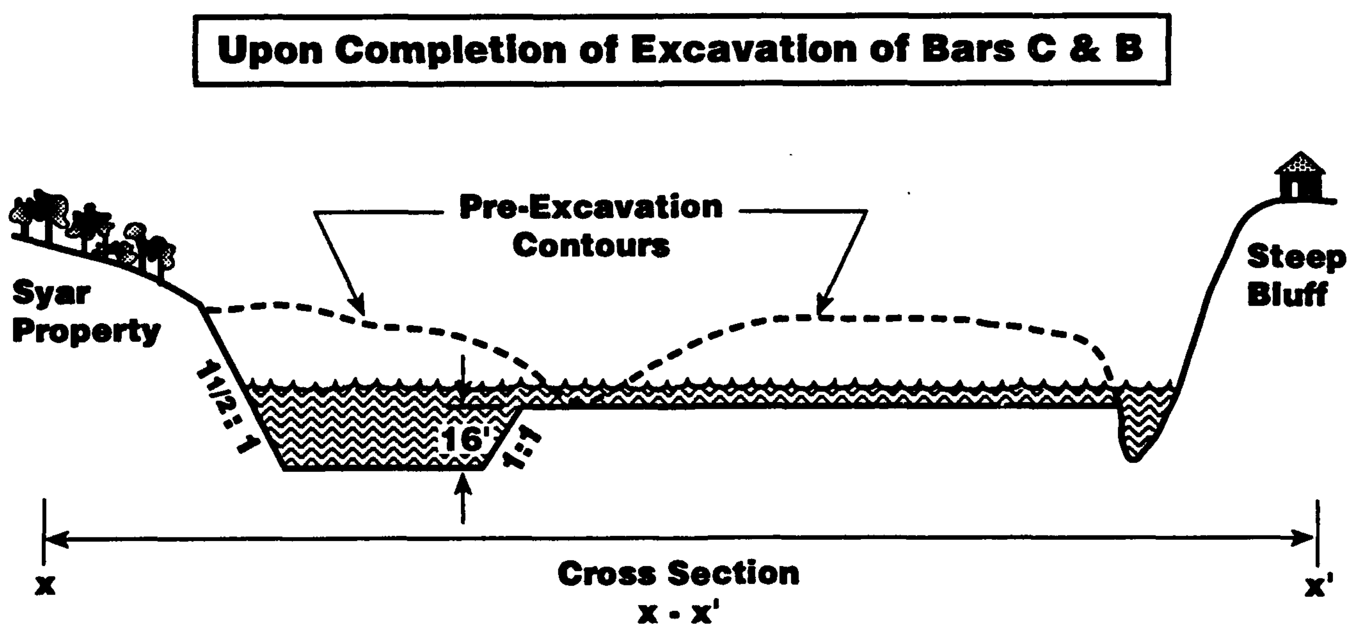


Figure 3-17
Representative Cross Section of the Russian River
Healdsburg Bendway

Details of the proposed excavation of the Healdsburg Bendway site are described in a report prepared by Simons and Associates, Inc., "Mining Plan and Reclamation Plan in the Healdsburg Bendway", which was submitted by the project applicant with its reclamation plan. The report states that one of the primary benefits of the excavation plan is the improvement of hydraulic conditions at the Healdsburg site. These improvements are necessary, according to the plan, because of "erosional processes" that have led to "increased destabilization of the bluff line above the bend." According to the applicant, this destabilization is due to the formation of a "landward pocket" in the bluff caused by erosion.

The proposed plan for bar excavation is intended to redirect river flow away from the bluff in order to relieve erosional pressures. According to the project applicant, excavation of Bars A and B would stabilize the river channel and reduce the erosion potential on the adjacent bluff, while Bar C would serve primarily as a source of gravel. In order to maintain the positive benefits of the plan, the applicant suggests that modest mining (subsequent to the initial excavation) be conducted on Bars A and B to maintain optimum hydraulic conditions throughout the bendway. The applicant expects that "very little maintenance or dredging" of these bars would be necessary. The applicant would continue to mine Bar C intermittently to maintain a maximum depth of 16 feet below the average bed level.

With implementation of the proposed excavation plan, it would be necessary, according to the project applicant, to "move the flow away from the bluff line." To accomplish this, the applicant proposes to construct five "spur" levees along the outer edge of the bend. (The proposed locations of these spurs are shown in Figure 3-15). The spurs would be between 100 and 180 feet long with a top width of 8 to 10 feet and side slopes of 2:1 (H:V) (see Figure 3-18). The spurs would be 10 to 12 feet tall and would be buried two feet in the riverbed. The base of the spurs would be roughly 48 feet wide. The elevation of the top of the spurs would range from 72 feet to 82 feet (downstream to upstream). The annual low water surface elevation is approximately 73.9 feet, which typically occurs after Labor Day. At this water level, four of the spurs would be exposed approximately 8 feet above the waterline. The downstream spur would be 2 feet below the surface. With the flashboards up at the Healdsburg Dam (typically in place from Memorial Day to Labor Day), the water surface elevation rises to 80.5 feet, so the downstream spur would be 7.5 feet below the water. The remaining four spurs would be visible up to 1.5 feet above the water.

Spur construction would require the importation of approximately 5,000 cubic yards of rip-rap (large rock material with specific size and shape characteristics). This material would likely come from the Santa Rosa area. Importation would require roughly 250 to 400 truck loads over a full construction season (April 1 to November 1). Access to the construction area would likely be from Highway 101, to Redwood Road and through the Syar processing plant facility. A temporary stream crossing would be constructed to allow access to "Bar B" for placement of the rip-rap.

As shown in Figure 3-18, proposed excavation and spur construction would be expected to facilitate the formation (aggradation) of a new bar in roughly the same location as Bar C. This new bar would periodically be excavated to a maximum depth of 16 feet below the average bed elevation.

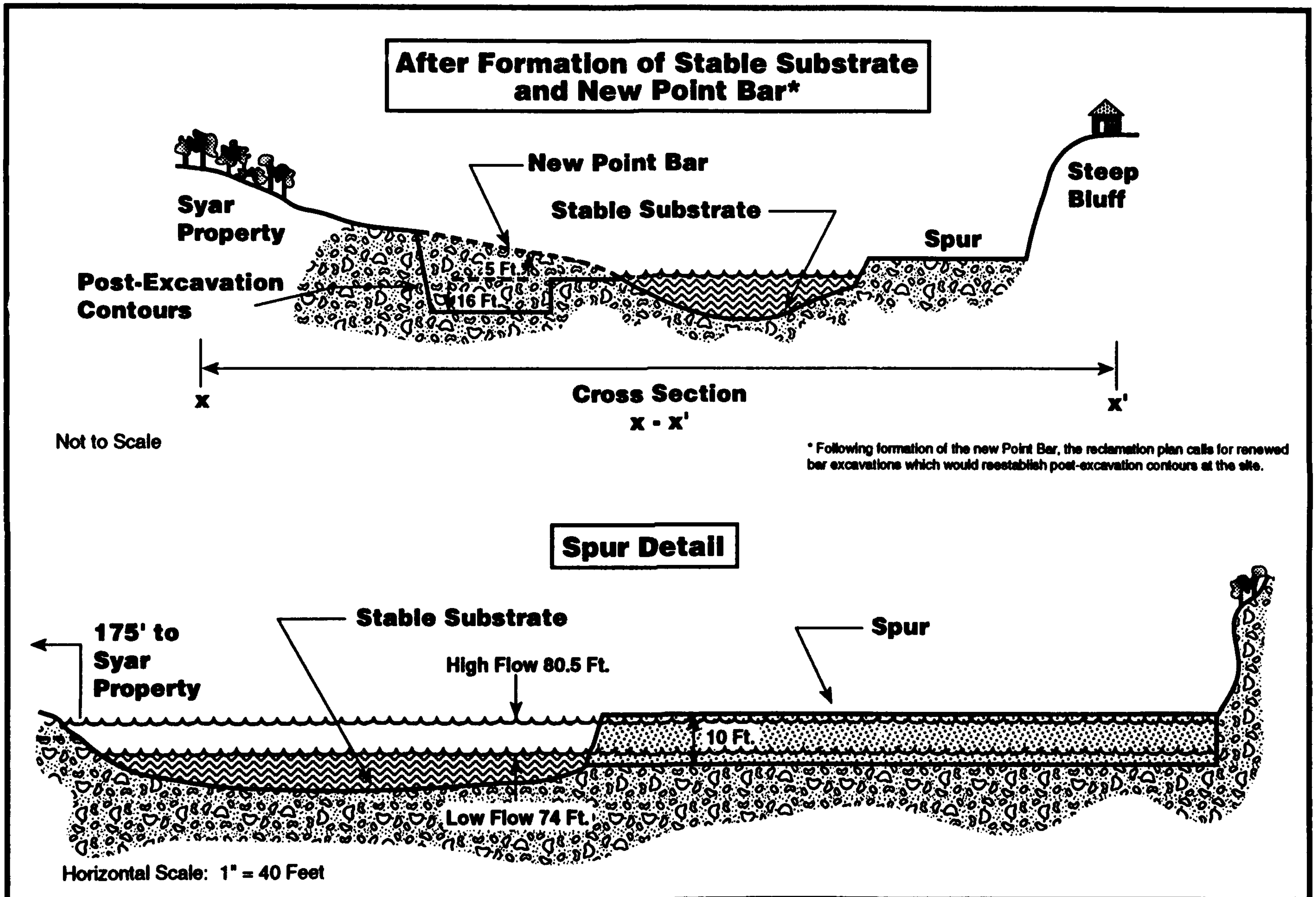


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Figure 3-18
Representative Cross Section of the Russian River
Following Stabilization of the Channel at the Healdsburg Bendway

Riverbend (Site 6)

The Riverbend site is east and approximately 0.5 miles upstream of the Healdsburg Bendway site. Residential areas are located to the north and agriculture and homes to the south of the Riverbend site. Proposed gravel extraction would occur on one 13-acre bar according to the reclamation plan (see Figure 3-19). This bar currently rises two to three feet above low summer flow. Under the proposed reclamation plan, the bar would be excavated to 16 feet below low summer flow (see Figure 3-20). Since the Riverbend site is within the backwater area of Healdsburg dam when the flashboards are in place, low summer flow would occur after Labor Day, when the dam flashboards have been removed. As shown in Table 3-1, initial mining operations at the Riverbend site would occur from September 1 through November 1, and would likely take two seasons to complete. Initially, 400,000 tons of gravel would be removed. Additional extraction would depend on replenishment, but would be limited to an average of 100,000 tons per year. Less than one acre of riparian habitat would be disturbed by project activities.

During excavation, a berm would be constructed to confine the flow to the natural channel and keep it out of the excavation area. In the fall, water would breech the berm, filling the excavation area. According to the applicant's reclamation plan, this would change the alignment of the river and decrease pressure on the outside bend at Riverbend. The applicant has stated that the new alignment would be intended to protect properties on the outside of the bend where erosion has occurred.

Access to the excavation area would be achieved by constructing a stream crossing in the location shown in Figure 3-20. A concrete box culvert that currently exists in the river channel would be temporarily bridged to provide the crossing. This culvert has been used in the past for mining operations at the Riverbend site. It is anticipated that no placement of fill in the active stream channel would be necessary to complete the crossing.

Stream Crossings

As discussed above, four of the five instream mining sites (Middle Reach, North Levee, Healdsburg Bendway and Riverbend) would require the construction of temporary stream crossings to allow the movement of mining and hauling equipment to mining areas. The project applicant's reclamation plans propose culvert and fill type stream crossings at each of these sites, except for the Riverbend site, which would make use of an existing inchannel box culvert. Since the Board must evaluate the reclamation plan as initially submitted, this EIR/EIS evaluates the effects of the culvert and fill type of crossing for the proposed project and alternative variations of the project (i.e., Alternatives 2 through 4). However, since the submittal of the reclamation plan, Syar Industries has proposed using "railroad flat car"-type crossings, which would reduce the amount of fill within the channel and provide better river passage for canoeists and fish.

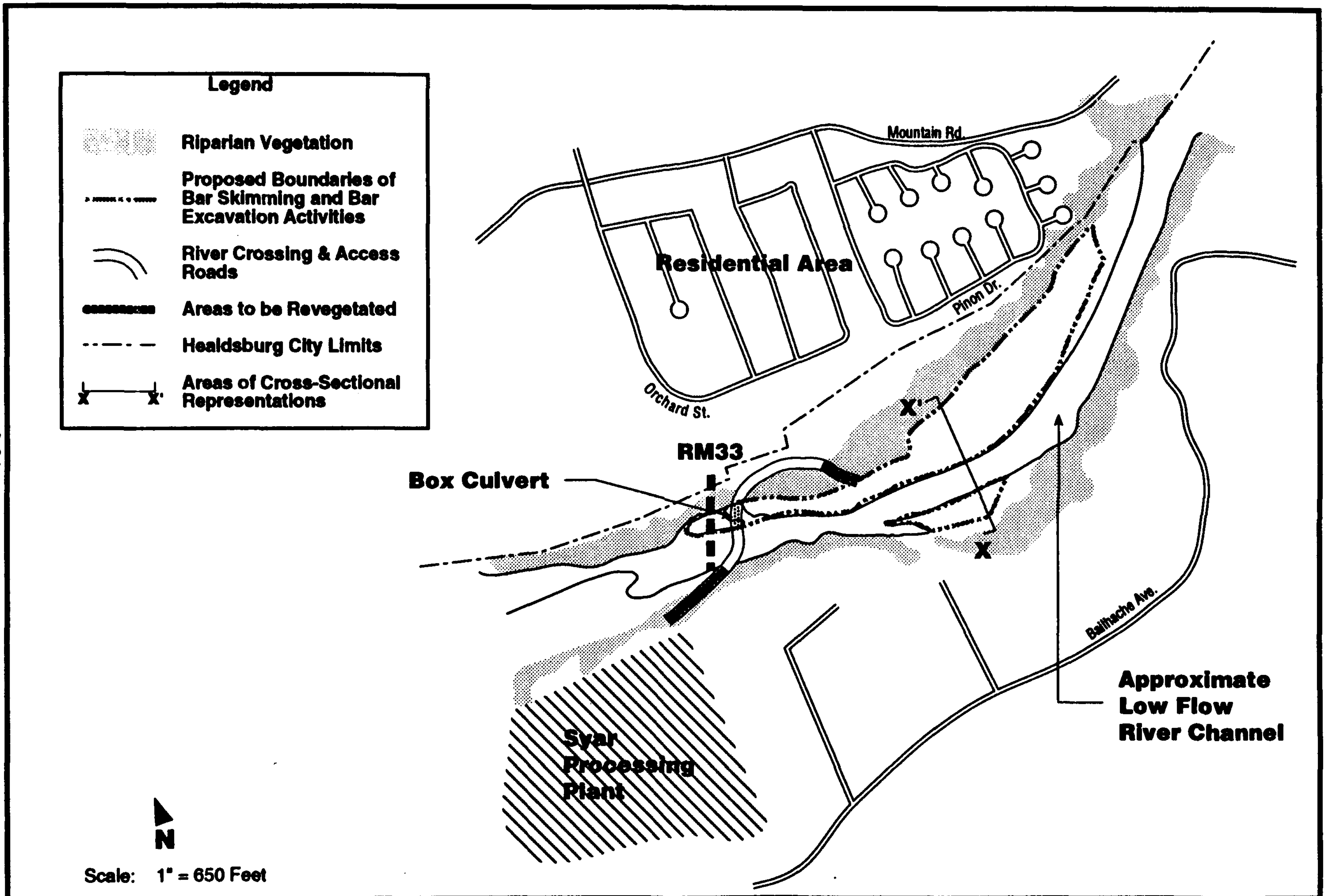


Figure 3-19
Riverbend Site
Proposed Bar Excavation Activities

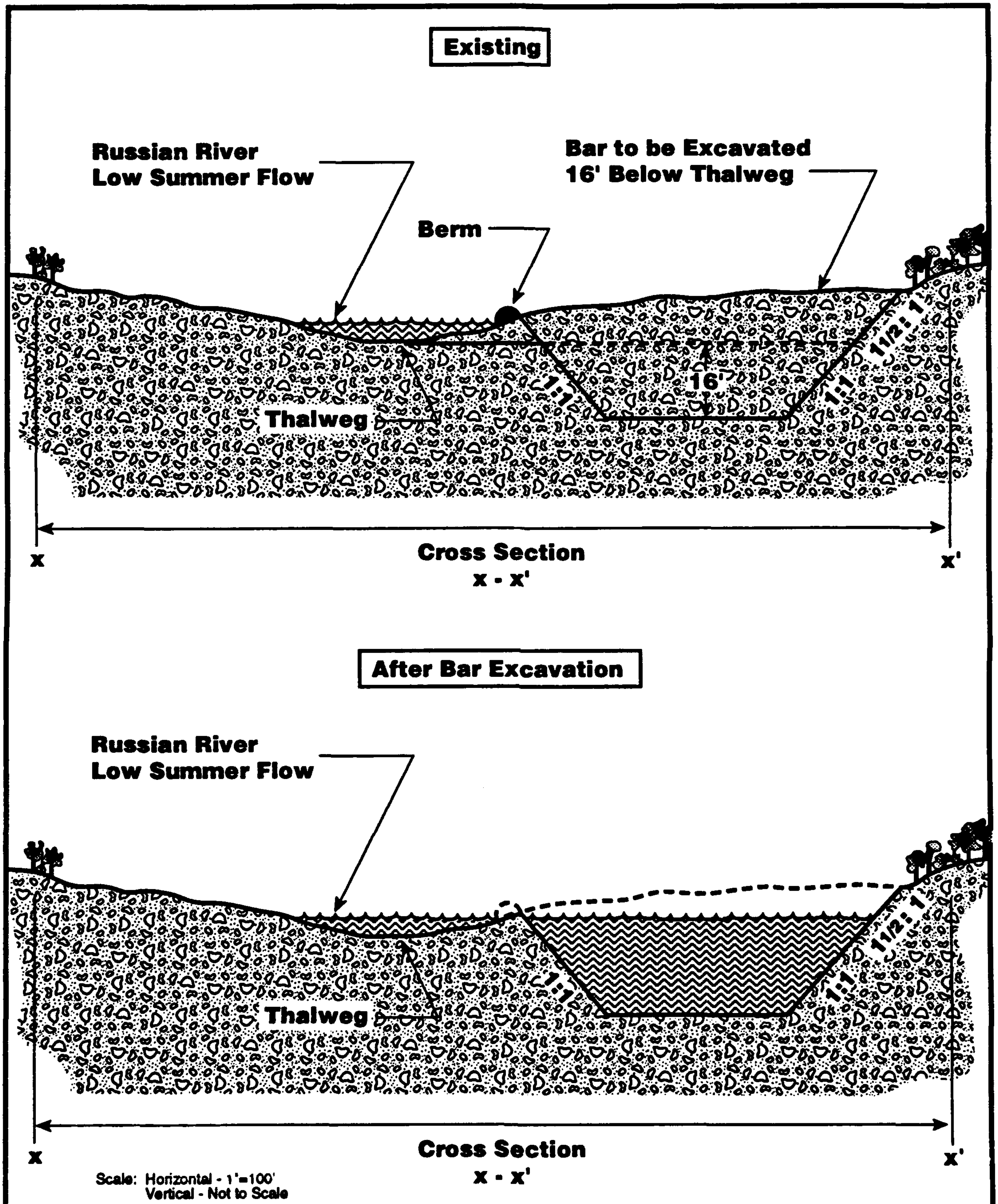


Figure 3-20
Representative Cross Section of the Russian River Riverbend

The flat car crossings were used in 1992 at the temporary Russian River crossing, located approximately 100 feet east of Highway 101. Historically, this crossing and a crossing at the confluence of Dry Creek and the Russian River have been constructed annually to link the Syar Industries processing plant with the haul road along the west bank of the river. This haul road has served terrace mining operations adjacent to the west bank of the river as well as previous instream operations. The specific design of the river crossing near Highway 101 is shown in Figure 5-1. This figure is a copy of the design drawing submitted to the Corps of Engineers for permit approval for construction of the crossing.

The river crossing near Highway 101 would consist of flat cars supported by I-beams or similar structures, and would be joined to the existing concrete box culvert. The flat car crossings would require 4,000 cubic yards of fill, as opposed to 4,800 cubic yards required by the culvert and fill crossings. Syar Industries has stated that the flat car crossing would not be constructed before April 15, and then only if river flows are below 1,000 cfs. The crossing would be removed by November 1. Once the crossing is removed, associated fill would be washed downstream by the river.

Alternative 3: Gravel Bar Skimming

Alternative 3 would allow only bar skimming at the five instream sites (South Levee, Middle Reach, North Levee, Healdsburg, and Riverbend) and pit excavation as described in Alternative 2 at the Doyle site. Skimming would take gravel above the 1 foot above summer low flow level, which is an unfixed elevation subject to change depending on river flow and elevation of the stream bed. Bars would be skimmed to create a 2 percent grade from low water to channel bank at the completion of mining operations at a particular site. Table 3-3 shows the estimated initial rates of aggregate extraction from each site for Alternative 3, as well as other proposed alternatives discussed in this EIR/EIS. Subsequent extractions at each of the proposed sites would be carried out depending on the amount of future replenishment above the one-foot line.

Under this alternative, it is assumed that the same number of truck trips would occur as under Alternative 2, and that the excavation schedule, schedule for construction of stream crossings, haul and grading equipment used and the bar revegetation plan would also be the same as Alternative 2.

The spurs proposed for construction under Alternative 2 would not be constructed at the Healdsburg Bendway under Alternative 3.

Alternative 4: Limited Bar Skimming and Adaptive Management

Alternative 4 would initially allow bar skimming at the South Levee Haul Road site only. The annual volume extracted would be initially limited to the estimated annual replenishment rate of 130,000 tons per year[2], or the actual volume replenished above present topography, ***whichever is less***. Bar skimming would be allowed only above a fixed topographic plane or "redline". Operations at the Doyle site would be identical to those described in Alternatives 2 and 3.

TABLE 3-3

COMPARISON OF MINING OPERATIONS BY ALTERNATIVE

Site	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Doyle	None	Floodplain pit 300,000 t/y[1] 60.1 acres	Floodplain pit 300,000 t/y[1] 60.1 acres	Floodplain pit 300,000 t/y[1] 60.1 acres	None
South Levee	None	Bar skimming 190,000 tons 15 acres	Bar skimming 190,000 tons 15 acres	Skimming above redline[3] 130,000 t/y or replenishment (whichever is less) 15 acres	None
Middle Reach	None	Inchannel, bar excavation and skimming 120,000 t/y[2] 42.5 acres	Bar skimming 70,000 t/y[2] 42.5 acres	None	F.plain/terrace skimming 224,000 t/y 44.1 acres, over 5 years
North Levee	None	Bar skimming 100,000 tons 15.6 acres	Bar skimming 100,000 tons 15.6 acres	None	None
Healdsburg	None	Channel and bar excavation and bar skimming 100,000 t/y[4] for 2 years on 10.5 acres	Bar skimming 33,000 tons on 10.5 acres	None	None
Riverbend	None	Channel and bar excavation 200,000 t/y for two years on 14.4 acres	Bar skimming 50,000 tons 14.4 acres	None	None

NOTES:
t/y = tons per year

[1] For 8 years.
[2] Over 2 to 4 years.
3 "Redline" is a fixed topographic plane below which excavation would not be allowed.

Under Alternative 4, the first year extraction rate at the South Levee Haul Road site would be equal to the best average annual replenishment estimate of 130,000 tons per year. Subsequent annual extraction rates would be limited to the actual replenishment above the redline, or 130,000 tons, whichever is less, until future monitoring data and studies of sediment transport indicated that higher rates could be extracted without causing significant impacts. Alternative 4 would also include an "adaptive management" approach to gravel extraction, such that new information could be integrated into planning of extraction projects. For example, cross sectional changes might suggest that certain bars in the Middle Reach be skimmed to arrest lateral channel migration and erosion, or that certain bars experience greater rates of deposition than others, or that impacts are less than expected. This approach would allow for flexibility in managing gravel extraction to avoid impacts and to provide possible benefits. The County would convene a management team of river experts to review detailed monitoring data to develop the criteria to be used to recommend appropriate extraction rates and locations. As new information on river behavior is gathered and the river degradation processes and sediment transport regime are better understood, the extraction rates and locations could be adjusted, but never below the established redline.

The redline would be defined as the plane 1 foot above the river stage at 300 cfs at the downstream end of each eligible bar with a 1% grade (1 foot in 100 feet) from the low flow channel to the river bank or levee, and a 0.1% grade (1 foot per 1,000 feet) from the downstream to the upstream end of the bar. The redline would cover the present surface at the upstream end of each bar for 200 feet, with a 100-foot buffer along the low flow channel. Riparian vegetation would not be disturbed in these buffer zones. Each bar would be excavated to a finished grade with a positive drainage toward the channel and downstream end. Excavation would proceed from the downstream end, leaving an opening to allow fish to escape back into the low flow channel after flooding.

In addition to limiting the extraction rate to the actual replenishment rate, the Alternative 4 project site is located in a depositional zone well downstream of important infrastructure. The South Levee site is within the sediment deposition and backwater area below RM 28 and more than 2 miles downstream of the Highway 101 Bridge. Although the precise volume of aggregate in these bars is not known due to a lack of topographic data, a simple estimate can be made. For example, if the bar comprises 20.52 acres, and if 80 percent of the bar volume were aggregate size material with a density of 100 lbs. per cubic foot (Vanoni, 1977), then one foot of excavation would yield approximately 36,000 tons of aggregate. A 3.6 foot average excavation depth would yield 130,000 tons of aggregate. From field observations it appears that this bar is well over four feet above the water surface at 300 cfs. If the river upstream remained stable or recovered by aggrading, a greater rate of extraction rate could be allowed, but never below the initial fixed redline.

The redline method, combined with an initial "safe yield" extraction rate and an adaptive management program, would have several advantages over the methods used to define bar skimming extraction limits in the past. First, the limits of extraction are defined by a precise and meaningful topographic datum, so that extraction could be modified or stopped if the overall topography of the channel continued to decline and caused any severe effects. Secondly, sediment deficits that might accumulate during dry periods (such as the 1986-1992 drought) would be eliminated. In the dry years gravel could be removed from other sources if necessary,

notably the Doyle Pit. Finally, more gravel could be taken if a large flood event replenishes the bars above present topography and in previously extracted sites, as long as the overall bed elevation were not in decline. This alternative could yield significantly less gravel over the project life.

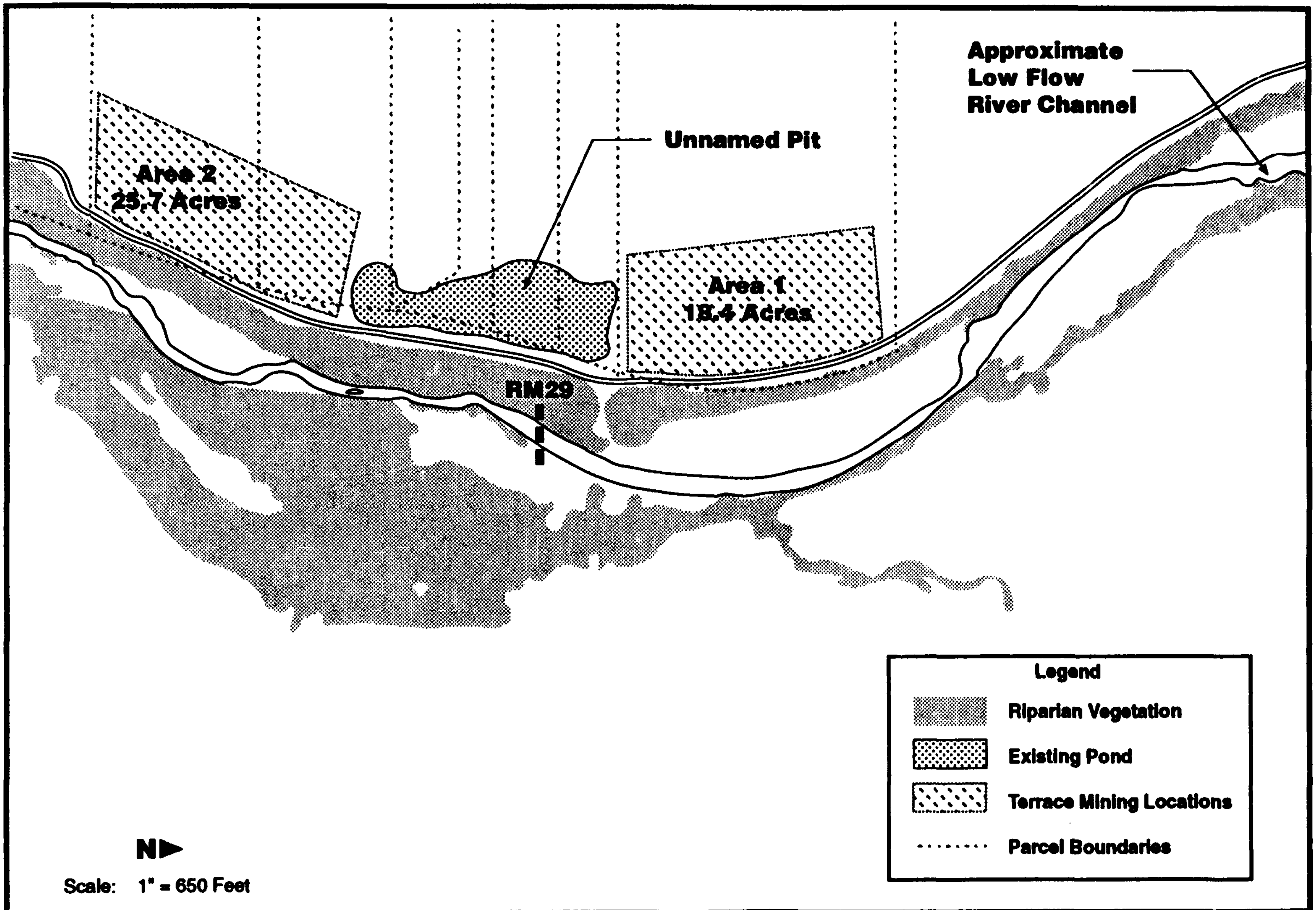
Under this alternative, the location of stream crossings, equipment used, and revegetation would be the same as Alternative 2. The number of truck trips would vary according to the replenishment level, but is assumed to be a maximum of 200 trips per day during operations. The daily schedule would also be the same, but the length of season may vary depending on the amount of gravel available. No stream crossings would be constructed. Operations at the Doyle site would be the same as those under Alternative 2. Hydraulic spurs would not be constructed at the Healdsburg Bendway.

Alternative 5: Floodplain Skimming/Streamway Development

Alternative 5 would limit mining to two areas encompassing approximately 45 acres of floodplain area adjacent to and west of the Middle Reach site (see Figure 3-21). These areas currently support vineyards. Gravel would be skimmed approximately 20 feet from the upper portion of the terrace, creating a lower terrace that could be reclaimed for agriculture, riparian forest or active public parks. Figure 3-22 presents a cross-section of the proposed area. An estimated 1,120,000 tons of gravel would be extracted from the site over five years. This would be excavated to connect to future skimmed floodplain areas. No other mining would occur in the project area. The existing levee would need to be relocated to the western edge of the site. The Doyle site would not be mined. The schedule, equipment and number of truck trips would be the same as Alternative 2. Spurs would not be constructed at the Healdsburg Bendway under this alternative.

3.5 Intended Use of the EIR/EIS and Required Approvals

There are a number of government agency actions that must be taken to implement any of the alternatives. CEQA requires that the EIR be certified by the lead agencies, in this case, the State Board of Mining and Geology (Board) and the City of Healdsburg (City). Similarly, the EIS must be adopted by the Corps of Engineers (COE). Because it is acting on an appeal, the Board must determine that the reclamation plans for the five county sites are complete, after which the County must approve the plans. Since they are vested, none of the County sites require County use permits for mining operations. For the Healdsburg Bendway, which is not vested, the City must approve a use permit and reclamation plan. Under SMARA and City and County ordinances, performance bonds must be posted for every site to ensure that reclamation takes place. Finally, some of the mining activities will require specific permits from state and federal agencies. Specifically, the required approvals are:



eip

Figure 3-21
Middle Reach Site
Streamway Alternatives

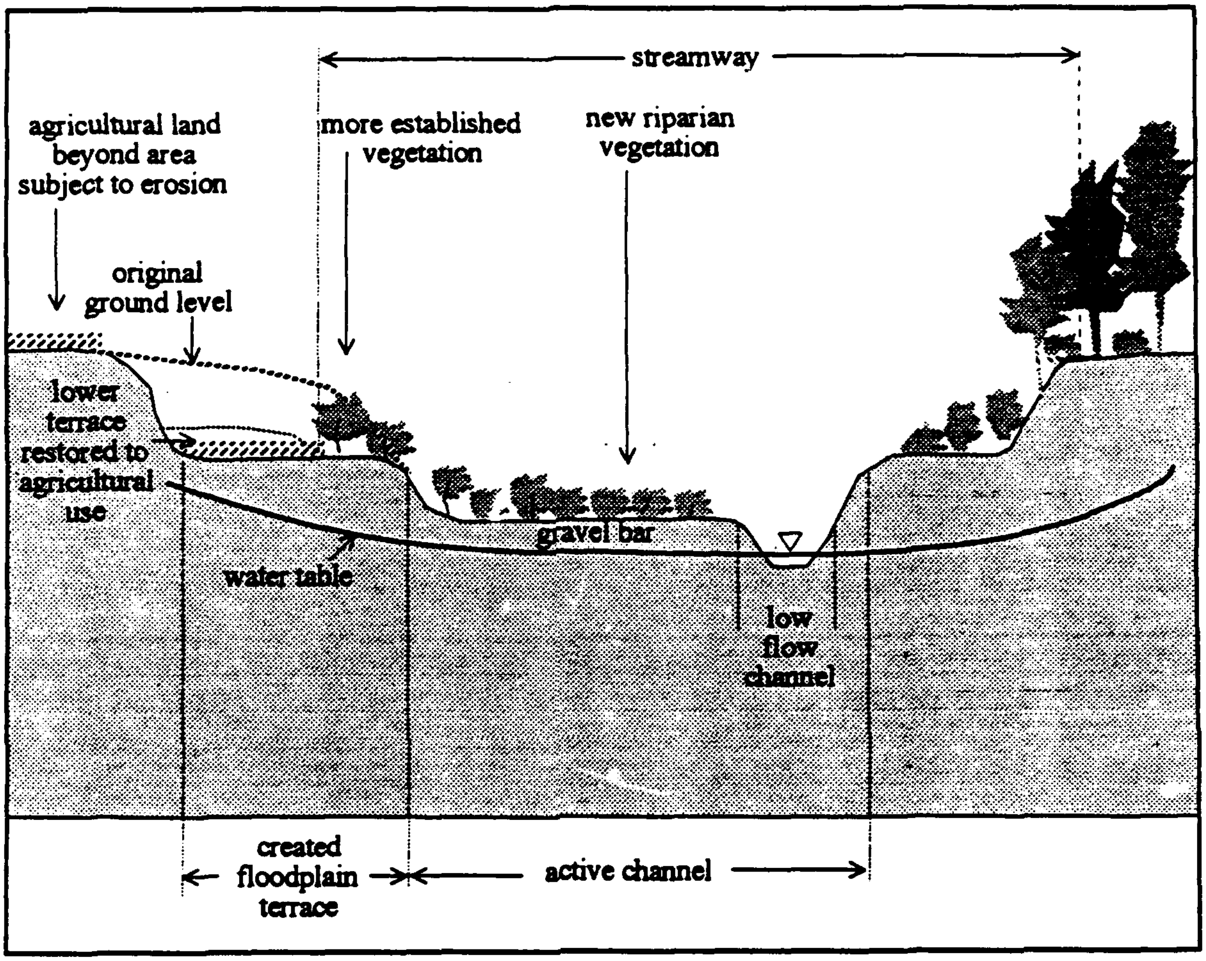


Figure 3-22

Representative cross section of the Russian River at the Middle Reach Site showing features of the streamway alternative. (From PWA 1992.)

- Certification of this EIR by the State Mining and Geology Board for Alternatives 2 through 5 (CEQA §21080a).

- Certification of this EIR by the City of Healdsburg for any activity at the Healdsburg Bendway under Alternatives 2 and 3 (CEQA §21080a)

- Adoption of this EIS by the U.S. Army Corps of Engineers for Alternatives 2 and 3 (NEPA §102).

- A Board finding that the reclamation plans are complete for Alternatives 2 through 5 (SMARA §2770g).

- City approval of a permit for mining and the reclamation plan for the Healdsburg Bendway under Alternatives 2 and 3 (SMARA §2770a; City Ordinance 788, §3103a and §3105)

- Sonoma County approval of the reclamation plans, as found complete by the Board, for the five sites under County jurisdiction for Alternatives 2 through 5 (SMARA §2770a; County Ordinance 3437 §26A-3b)

- Syar Industries must secure a performance bond sufficient to cover the estimated costs of reclaiming and maintaining each site for Alternatives 2 through 5 (County Ordinance 3437 §26A-8; City Ordinance 788 §3108)

- Granting of a 404 permit from the USCOE prior to construction of the spurs (Alternative 2) or placement of berms in the channel or channel crossings (Alternatives 2 and 3) (33 UCS §1344).

- Granting of a Streambed Alteration Permit (California Resources Code 1603) from the State Department of Fish and Game for any activity in the channel (Alternatives 2 through 4)

- Resolution of a legal dispute between Syar Industries and the State Lands Commission. The SLC contends that it has title to the beds of navigable water ways, including the Russian River up to, and possibly beyond, the City of Healdsburg. A discussion of this issue appears on pages 4.8-3 and 4.8-15, in the Land Use section of this EIR/EIS.

ENDNOTES

1. An inconsistency exists between the text and diagrams submitted by the project applicant with the Middle Reach Reclamation Plan. The text identifies the side slope of the temporary channel as 1:1.5 while the cross-sectional diagram shows the slope as 1:1. The proponent indicates that the text probably contains a typographical error, as a slope of 1:1 is intended.

2. Philip Williams and Associates, 1992. Hydrologic Aspects; Aggregate Resource Management Plan Update and EIR: Report to Sonoma County Department of Planning and EIP Associates, San Francisco.

4. ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION TO THE ANALYSIS

4.1 ENVIRONMENTAL ANALYSIS INTRODUCTION

TOPICS ADDRESSED

The Environmental Analysis section of this EIR/EIS discusses the environmental setting, impacts, and mitigation measures for each of the following topics:

- Geology and Soils
- Hydrology and Channel Dynamics
- Surface Water Quality
- Groundwater
- Fish Resources
- Terrestrial Biological Resources
- Land Use
- Visual Quality
- Recreation
- Cultural Resources
- Traffic
- Air Quality
- Noise
- Public Health and Safety

SECTION FORMAT

Each section will begin with a description of the **setting** as it pertains to a particular issue. The setting description will be followed by an **impacts and mitigation** discussion. The impact and mitigation portion of each section begins with a description of the **standards of significance** used to evaluate impacts and the **method of analysis**. Impact statements are numbered and appear in bold text. An explanation of the impact as it relates to each alternative, with an analysis of its significance, follows each impact statement. All mitigation measures pertinent to each individual impact follow directly after the impact statement and have the same number. The degree of relief provided by identified mitigation measures is also evaluated. The format is shown below.

4.1-0 Statement of impact.

A-1 Discussion of the impact of Alternative 1 in paragraph format. Statement of ***level of significance of impact*** included at the end of each impact discussion.

A-2 through A-5

When the severity of impacts associated with different alternatives is identical, they are grouped. Again, the ***level of significance*** will be identified.

<u>Mitigation Measures</u>

Implementation of the following mitigation measure would reduce the impact *to/but not to a less-than-significant level.*

4.1-0 *Recommended mitigation measure presented and numbered to correspond with the impact statement. The alternatives to which the measure applies are identified. Mitigation measures are italicized.*

4.2 GEOLOGY AND SOILS

4.2 GEOLOGY AND SOILS

INTRODUCTION

This section addresses the impacts associated with the alternatives as they relate to soil, seismic and geologic conditions within the project area.

SETTING

Project Location

The project site is located in the Russian River Basin in the northern portion of the Coast Ranges Geomorphic Province. This province is characterized by northwest-southeast trending mountain ranges and alluvial valleys, and extends from Santa Barbara to Del Norte Counties. Folding, faulting, and uplift have occurred and continue to occur in this area as the Pacific and North American Plates exert opposing forces on one another.

The Russian River is the principle water course in Sonoma County and drains southerly out of Alexander Valley in the vicinity of Healdsburg. At this point the river flows west to the Pacific Ocean.

Geology

Mining operations within the project site consist of terrace and bar skimming extraction of gravels deposited during the Quaternary Period over the last 3 million years.

In general, the river basin is underlain by the Franciscan formation, which was deposited when the region was covered by oceans during the Jurassic-Cretaceous Period. This is a mechanically weak and clay-rich formation consisting of sandstone, shale, greenstone, cherts and serpentine. This is considered the basement rock of the Coast Ranges.

Other formations found in the Russian River Basin include the Merced formation (Pliocene sandstone), Sonoma Volcanics (Pliocene basalts and ash), the Glen Ellen formation (Pliocene/ Pleistocene sedimentary and volcanics), and river terrace and alluvial fan deposits of the Pleistocene Epoch. The terrace and alluvial fan deposits are coarse grained gravels and sands near the river channel and valley centers, and finer silts and sands at the valley edges.

The geologic structure of the Russian River basin is dominated by the northwest trending faulting associated with right lateral movement along the San Andreas and other subsidiary faults. Differential rates of movement along these right lateral faults during the mid- to late-Tertiary period created depressions in the earth's crust, or "pull apart basins", that eventually became the major alluvial valleys of the present Russian River and Dry Creek. Deposition of sediments in these valleys over the past 13,000 +/- years, after the end of the last glacial period, formed the valley floors and alluvial aquifers present today.

Large earthflows and other landslides are common in the Russian River basin due to the predominance of highly sheared, clay-rich Franciscan Complex rocks combined with active faulting and uplift. Large earthflows and other types of landslides within Franciscan Complex rocks are visible along the Russian River and Highway 101 between Cloverdale and Hopland, and within the Big Sulphur Creek watershed, an 82 square mile tributary watershed east of Cloverdale. These landslides, or "mass wasting" geomorphic processes, are most often activated during major winter storms. Thus, the landslides contribute high volumes of coarse sediments directly into tributary streams and the Russian River during flood conditions.

Seismicity

The project is located in a seismically active area. The San Andreas fault system is located on the western edge of Sonoma County, and is approximately 30 miles southwest of the project site. In addition, the Healdsburg-Rodgers Creek and Maacama-Talmage faults are located within 10 miles of the project site. These three faults are historically active, and have exhibited varying levels of rupture in the last 80 years. There are at least ten other faults considered potentially active within a 50-mile radius of the project.

Soils

There is great diversity of soil types throughout Sonoma County, and several different soils are found within the project site vicinity.

The most predominant association of soils at the project site is known as the Yolo-Cortina-Pleasanton Association. Generally, these soils are located on floodplains, alluvial fans, and low terraces in major and minor streams and drainages. The most common occurrence of this soil association is in the Russian River and Dry Creek valleys.

These soils are formed on alluvium and derived from mixed sedimentary and basic rocks. Vegetation typically growing in these soils includes annual and perennial grasses and legumes, and scattered oaks and shrubs. Along streams and channels, dense thickets of willows and wild berry vines are common.

The Yolo-Cortina-Pleasanton Association represents approximately 3 percent of the soils in Sonoma County. Yolo soils represent approximately 60 percent of the Association while the Cortina and Pleasanton soils represent approximately 15 percent each of the group. The remaining 10 percent of the Association consists of the Arbuckle, Manzanita, Pajaro, Positas, and Zamora soil units.

The Yolo soil is described as well-drained, grayish-brown sandy loam, gravelly loam, silt loam, loam or clay loam. This soil is considered the most important soil in Sonoma County for farming. The most commonly grown crops are grapes, orchards, and row crops, or the soil is used for pasture land.

The Cortina soil is described as excessively drained, very gravelly, sandy loam or very gravelly loam. This soil is considered to be droughty, but when properly irrigated, it is used to grow grapes and other crops. It is also used for pasture land.

The Pleasanton soil is described as well-drained, brown, gravelly loam, loam, gravelly clay loam, or clay loam. This soil is considered highly fertile and excellent for farming. It is used to grow grapes, orchards, and hay. It is also used as pasture land.

Other soils found in the project area are riverwash and sandy alluvium. Sandy alluvium is described as sandy or gravelly deposits along streams. Stratification is variable, and recent overwashes tend to change the texture of the surface layer from time to time. Streambank cutting and erosion is a problem in some areas. Vegetation varies, but consists mostly of willows, wild berry vines, woody shrubs, and to a lesser extent, grasses and sweet clover. This soil type is used primarily for grazing or wildlife habitat.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this EIR/EIS, an impact would be considered significant if the alternative could expose people, structures, or property to major geologic hazards, such as earthquakes, landslides, mudslides or ground failure. An impact would also be considered significant if the alternative would promote permanent loss of natural resources.

Methods of Analysis

The alternatives were evaluated for potential impacts by identified geologic hazards documented in existing data sources. Proximity to existing fault lines was evaluated in relation to potential seismic hazard to the proposed projects. Implementation of the alternatives was also evaluated for impacts due to other geologic hazards, such as erosion and mass wasting.

Project Impact

4.2-1 Gravel extraction from river terraces and bars creates pits which increase the potential for side slope instability.

Large open pits are formed during terrace mining and channel excavation activities. The side slopes of these pits are often steep and unstable. If adequate slope stability is not maintained, the side slopes may slide and promote increased erosion of river banks and terraces.

A-1 The No Project Alternative states that no mining or reclamation activities would occur in the project area. Therefore no pits would be formed and side slope instability would not be present. This is considered a ***less-than-significant impact.***

A-2 through A-5

These alternatives propose bar skimming or terrace extraction at the project sites. Under these alternatives, excavation pits would be formed and the potential for side slope instability would be present.

Under Alternative 2, gravel would be extracted from all of the sites by bar skimming or terrace extraction. Proposed side slopes for the pits formed from these operations are 1.5 to 1 (horizontal to vertical) for slope areas above the waterline, and 1 to 1 (horizontal to vertical) for slope areas below the waterline.

Alternatives 3 and 4 propose gravel bar skimming, and Alternative 5 proposes terrace extraction. Proposed side slope ratios for pits formed by these operations are the same as those for Alternative 2.

Use of steeper slope ratios could increase slope instability, and should be approved by a Certified Engineering Geologist or a Registered Geotechnical Engineer. Therefore, the implementation of any of these alternatives would be considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce this impact to a *less-than-significant level.*

4.2-1 *All slopes shall comply with slope gradient and slope stability requirements in the Sonoma County ARM Plan. Slopes measuring greater than 1 to 1 (horizontal to verticle) shall be analyzed by a Registered Geotechnical Engineer or Certified Engineering Geologist for stability. This measure would be required for Alternatives 2 through 5.*

Project Impact

4.2-2 Gravel extraction from the deep pit at the Doyle site could increase the potential for slope instability.

Three of the alternatives would include gravel excavation of a deep pit at the Doyle site. Steep banks would form the sides of this pit and would be susceptible to slope failure if slope ratios are inadequate.

A-1 and A-5

The No Project Alternative and Alternative 5 would not include excavation at the Doyle site. Therefore this impact would be ***less than significant.***

A-2 through A-4

These alternatives would include excavation of the Doyle site and the formation of steep sided slopes within the pit. Slope gradients proposed for the alternatives are 1.5 to 1 (horizontal to vertical) for slope areas above the waterline, and 1 to 1 (horizontal to vertical) for slope areas below the water line. Though a 1 to 1 is generally considered a stable slope gradient, gradients above that value should be assessed by a registered professional for adequate safety. This is considered a ***significant impact.***

<u>Mitigation Measures</u>

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.2-2 *Implement Mitigation Measure 4.2-1. This measure would be required for Alternatives 2 through 4.*

<u>Project Impact</u>

4.2-3 Accelerated erosion of overburden topsoil removed from the Doyle site could occur during gravel extraction operations.

A-1 and A-5

The No Project Alternative and Alternative 5 would not include excavation at the Doyle site. Therefore this impact would be ***less than significant.***

A-2 through A-4

These alternatives would include excavation of the Doyle site. The excavation operations would require the removal of overburden topsoil which would be stored on the site. The Doyle site is close to the river, and if the topsoil is not adequately protected from wind and rain, it could be a potential erosion hazard, degrading water quality in the river. This is considered a ***significant impact.***

<u>Mitigation Measures</u>

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.2-3(a) *Erosion control measures shall comply with the recommendations and standards of the Sonoma County Surface Mining and Reclamation Ordinance. This measure would be required for Alternatives 2 through 4.*

4.2-3(b) *Overburden topsoil that is removed shall be placed behind existing berms on the Doyle site. This measure would be required for Alternatives 2 through 4.*

4.2-3(c) *A sediment detention pond shall be constructed to collect potentially eroded topsoil at the Doyle site. This measure would be required for Alternatives 2 through 4.*

By placing the topsoil behind existing berms, the potential for eroded soil being transported to the river is essentially eliminated. The sediment detention pond would collect any soil or sediment runoff from the site. The collected water and soil could be filtered and reused on site or transported for use at another location.

Project Impact

4.2-4 Workers could be exposed to seismically induced hazards on the project site.

A-1 Since no work would occur on the project sites under this alternative, this is considered a ***less-than-significant impact***.

A-2 through A-5

A major earthquake in the region surrounding the proposed project site could lead to substantial groundshaking. Groundshaking could cause slope failure in the deep pit and other excavation areas. Therefore, this is considered a ***significant impact***.

Mitigation Measure

Implementation of the following mitigation measure would reduce this impact to a *less-than-significant level.*

4.2-4 *Implement Mitigation Measure 4.2-1.*

4.3 HYDROLOGY AND CHANNEL DYNAMICS

4.3 HYDROLOGY AND CHANNEL DYNAMICS

INTRODUCTION

Excavation of the Russian River channel and floodplain as proposed under the alternatives could have wide-ranging effects on a number or interrelated resource areas (e.g., geology, hydrology, fluvial geomorphology (streambed dynamics), and groundwater). For this reason, Swanson & Associates, Hydrologists and Geomorphologists, was retained to conduct an analysis of the Syar reclamation plans and alternatives. Swanson & Associates' full report appears as Appendix C. Geomorphology is the study of the earth's surface and the processes that form it. Fluvial geomorphology relates to the form and processes of streams, and specifically the transport of sediment and the shape of the channel and floodplain. A geomorphic analysis is necessary because the proposed project and alternatives would modify the shape or "morphology" of the Russian River channel, and could change the sediment transport characteristics. Geomorphic changes or geomorphic adjustments caused by the project could affect channel stability, erosion and sedimentation regime, flood control, water quality, physical attributes of aquatic and terrestrial wildlife habitat, the extent of and growing conditions for riparian vegetation, groundwater supply and quality, and the stability of public infrastructure near the Russian River (bridges and groundwater wells). Hydrology and channel dynamics are discussed in this section of the EIR. Water quality and groundwater are discussed in Sections 4.4 and 4.5, respectively.

SETTING

Geology, Geomorphology and Climate of the Russian River Drainage Basin

The Russian River is a major California north coast river draining a 1,485 mi^2 basin, extending from the inland Ukiah Valley in central Mendocino County on the north and the Santa Rosa Valley to the south, into the Pacific Ocean at Jenner (Figure 3-1). The basin is located within the California Coast Range Physiographic Province, which is characterized geologically by northwest trending mountain ranges and intervening alluvial (recently sediment filled) valleys. The Russian River flows through the Ukiah, Alexander and Healdsburg alluvial valleys from north to south. The valleys are separated by narrow canyon reaches where the river has cut through mountains. Dry Creek, a major tributary entering the Russian River below Healdsburg at river mile (RM) 30 (as measured from the mouth of the river at Jenner), drains 127 square miles, and also flows southward through a 10-mile long northwest trending alluvial valley.

In the Ukiah Valley, the Russian River flows in a relatively straight channel lined with dense riparian vegetation. Gravel extraction (instream and floodplain) occurs within the Russian River and on the floodplain of the Ukiah Valley. The instream extraction rate was approximately 100,000 tons in 1988, an annual rate thought to be typical for the 1980s.[1] Since 1988, the

instream operations have been reduced with greater emphasis on quarry extraction. Instream extraction rates dropped to 45,000 to 60,000 tons per year for the 1990 to 1992 period. Gravel mining occurred historically in Forsythe Creek, a major tributary to the upper Russian River. Instream gravel mining and damming of the East Branch of the Russian River by Coyote Dam caused up to 16 feet of channel bed degradation from the mid-1960s to the mid-1980s at the City of Ukiah's water intakes (lines buried under the riverbed gravels). Lake Mendocino Reservoir has annually trapped an average of 21,000 tons of gravel-sized sediment from a 105-square mile watershed (using Sonoma County Water Agency sedimentation data and assuming 10 percent of the total sediment trapped is bedload or gravel sized material). Applying this sedimentation rate to the upstream end of the Ukiah Valley, the reach under extraction yields 18,700 tons per year from the West Branch Russian River and Forsythe Creek basins. This estimate is probably too high considering that Forsythe Creek has experienced bed degradation down to older clay alluvium. If the sedimentation rate is applied to the downstream end of the Ukiah Valley at Hopland (undammed drainage area of 257 square miles) the replenishment rate is 51,914 tons per year. This data suggests that historical extraction rates have exceeded the supply and have contributed to the observed degradation.

Below the Ukiah Valley, the Russian River enters confined reaches through Hopland, through the landslide areas near Squaw Rock, and down to Cloverdale and the Sonoma - Mendocino County line. At Cloverdale, the Russian River enters the 20-mile long alluvial Alexander Valley. The alluvial fill of the Alexander Valley reaches depths up to 200 feet, and is covered with high quality agricultural soils, which now support extensive vineyards. Within the Alexander Valley, the Russian River flows within a steep, wide, shallow, sinuously-braided channel that commonly shifts laterally, causing bank erosion. Abrupt channel pattern changes are common in sinuously-braided streams where gravel bars and the entire channel pattern migrates downstream. In the 1981 to 1986 period, over 500 acres of floodplain were eroded due to lateral migration of the channel.[2] In the 1950s, the Corps of Engineers attempted to stabilize the river by channelization and the installation of jacks and rip rap. These efforts failed to increase stability.

Instream gravel extraction in the Alexander Valley Reach averaged 726,500 tons per year during the period 1981-90.[3] Volume changes calculated between a sparse network of cross sections during the same period were a net volume loss of 630,000 tons per year[4] resolving a "safe yield" of 96,500 tons per year. The average thalweg elevation change at 7 cross sections was negative 1.7 feet. Degradation occurred at 5 cross sections with a maximum of 7.5 feet of change. Aggradation occurred at two cross sections with a maximum aggradation of 6.75 feet, which may be attributed to a local release of sediment from bank erosion.

The Russian River flows out of the Alexander Valley near the Jimtown Bridge and enters Digger Bend, a sinuous canyon where the Russian River is confined by Fitch Mountain. The channel flows over a thin layer of alluvial sediments with alternating gravel bar morphology. Bar lengths are typically 500-1500 feet long, and alluvial terraces bound the canyon sides. Similar to the Alexander Valley Reach, the gravel bars migrate in a downstream direction through Digger Bend. Most of the land use in Digger Bend is residential, with some channel modification, erosion control and some gravel extraction.

The Russian River flows into the project site at the mouth of Digger Bend 1.0 miles east of Healdsburg near the Bailhache USGS stream gage "Russian River at Healdsburg" (drainage area of 793 square miles). The project site is within a 10-mile long alluvial valley often termed "the Middle Reach", with Healdsburg at the north end, the Dry Creek confluence 1.2 miles downstream, and the Wohler Bridge below the downstream end.

Below Wohler Bridge, the Russian River turns to the west, flowing through a narrow valley bounded by mountains. The channel in this reach is deep and straight, with a low floodplain. The town of Guerneville sits on a low floodplain area on the north side of the river and is subject to frequent flooding, on average once every 5 years. Gravel and sand bars are common within the channel. Below Guerneville, the Russian River becomes a coastal estuary, where river depths and sediment transport are affected by the dynamics of the sand bar crossing the river mouth at the Pacific Ocean.

Sediment transport measurements were taken at the USGS stream gage near Guerneville for suspended load (daily records 1967 to 1986, sporadic thereafter to present) and bedload (1985 and 1986).[5] The average suspended load for the period 1969 through 1986 was 1.2 million tons, while bedload for the 1985 and 1986 flow years averaged 56,072 tons per year. Bedload yield averaged 4.4 to 6.9 percent of the suspended load for 1985 and 1986 respectively, and long-term suspended load measurements averaged 1.2 millon tons per year. It is probable that 56,072 tons per year represents a long-term average bedload transport for the Guerneville gage.

Climate and Streamflow

The Russian River drainage basin has a Mediterranean climate, characterized by warm dry summers and cool wet winters. About 80 percent of the annual precipitation occurs during passage of Pacific frontal storms from November through March, with maximums occurring in December and January. Mean annual precipitation ranges from more than 80 inches per year in the mountains southeast of Cloverdale in the Big Sulphur Creek drainage, to about 30 inches per year in Santa Rosa. Snow does fall at higher elevations, but it rarely accumulates or remains for more than several days. The temperatures are generally mild, with mean monthly temperatures of 45 degrees in January and 71 degrees in July.

Stream flow is measured at 13 gaging stations along the Russian River and its tributary streams. Based on 51 years of record (1939 to 1990), flow at Guerneville, downstream of the Healdsburg project reach, averaged 2,282 cubic feet per second (cfs). Flow at the Healdsburg gage averaged 1,418 cfs for the same period. Flows in Dry Creek averaged 342 cfs from 1939-1983, prior to closure of Warms Springs Dam. After closure of the dam (1983-1990), flows in Dry Creek averaged 176 cfs. The flood of record at the USGS Healdsburg gage was 71,300 cfs, about a 20-year flood event occurring on December 23, 1964. The February 17, 1986 flood was virtually the same at 71,100 cfs, well within the minimum 10 percent error of measurement. Dry Creek had a maximum flood of 32,400 cfs on January 31, 1963, and a peak flow of 5,280 cfs on February 17, 1986 (after regulation by Warm Springs Dam). The flood frequency of the Russian River at Healdsburg and for the project reach is presented in Figure 3.4 of Appendix C.

The major water resources development projects in the Russian River basin, Warm Springs Dam on Dry Creek and Coyote Dam on the East Branch of the Russian River, have altered the hydrology of the river at the project reach in two ways. Coyote Dam has only a slight effect on winter flood flows at Healdsburg due to the limited drainage area it controls (13 percent), but summer flows have increased due to summer releases from Lake Mendocino and inputs from the Eel River basin through the Potter Valley Diversion. There is some evidence that the higher summer flows have increased the density of riparian vegetation along the Russian River in the Ukiah Valley. Warm Springs Dam has significantly reduced flood flows in Dry Creek to less than 25 percent of the pre-dam rates. The floods of 1963 and 1986 on Dry Creek were of a comparable size, yet flow regulation by Warm Spring Dam reduced the peak flood approximately 83 percent.

Project Site Geomorphology and Hydrology Setting

The project reach is located within the channel and floodplain (or terrace) of the "Middle Reach" of the Russian River between RM 33, just upstream of Healdsburg at the mouth of Digger Bend, to Site 1, Doyle Pit, at RM 26. The detailed study area extends further downstream to the Wohler Bridge at RM 23.

The Russian River in the Middle Reach consists of a generally straight channel aligned in the center of a broad floodplain and valley floor. The floodplain is about 2 miles wide at the upstream end just below Healdsburg, narrowing to 1,500 feet at the Wohler constriction at RM 24. Land use on the valley floor is dominated by vineyards and active or abandoned gravel extraction pits. Agricultural uses and gravel terrace pits have encroached on the floodplain to the top of the channel banks.

The Healdsburg Dam divides the project reach into two distinct geomorphic reaches, with differing geomorphic forms and processes. Below the Healdsburg Dam, the river is influenced during flood events by ponding caused by the Wohler constriction; the narrow end of the Healdsburg Valley that restricts flood outflow, creating a "backwater area" during major flood events for about 3.7 miles upstream (see Figure 4.3-1). This hydraulic backwater area is reflected by the corresponding flat channel bed topography in this area which is illustrated in Figure 4.3-2. The channel slope (the ratio of elevation loss to linear distance down the channel) is 0.00033 between the Wohler bridge and RM 27.7, less than one half the slope of the reach from RM 27 to RM 31.5 at the Highway 101 bridge (0.00084). This backwater effect is also reflected in high water marks from the December, 1964 flood of 70,000 cfs and from accounts of the February, 1986, flood which had approximately the same discharge.

Sediments on gravel bars and in the low flow channel are generally coarser at the upstream end of the study reach, near Highway 101 (coarse gravel, 0.5 to 1.3 inches in diameter), becoming finer downstream to the Wohler constriction (sand and fine gravel, 0.3 inches in diameter). Near the Wohler constriction, channel bed sediments become finer, ranging from sand to silt. However, downstream of the constriction, after the river passes through a 90 degree bend to the west, bed sediments coarsen to small cobble sizes. Between this bend and the Wohler Bridge bed sediments become dominated once again by gravel and coarse sand sizes. Riffles below

Figure 4.3-1
Aerial photograph of the Wohler constriction (RM 24.5) on the Russian River upstream of the Wohler Bridge.

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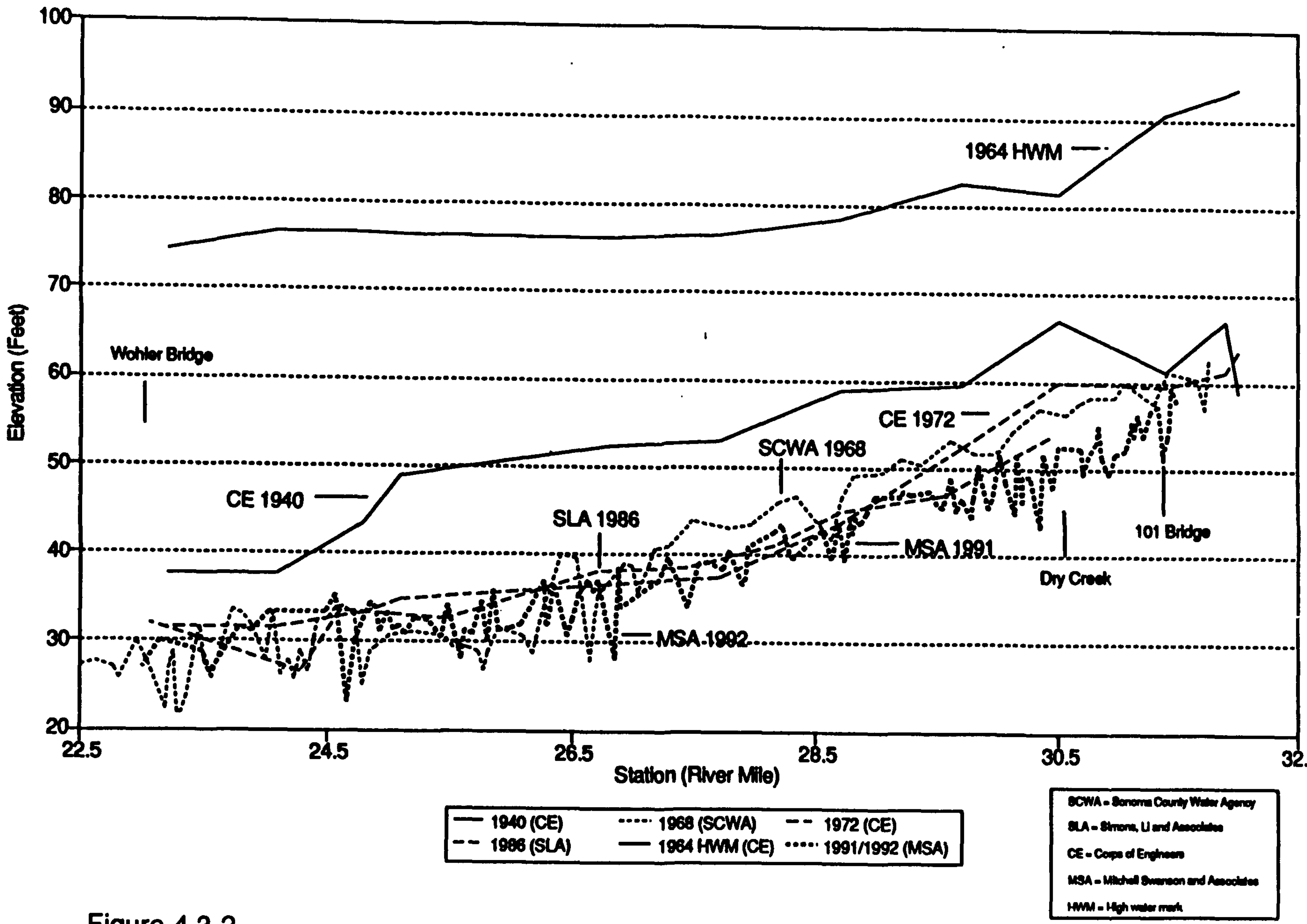

Figure 4.3-2

Longitudinal profile of thalweg elevations surveyed in 1940, 1968, 1972, 1986 and 1991-92 and high water elevations for the 1964 flood on the Middle Reach of the Russian River.

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Highway 101 have maximum sediment grain sizes in the cobble range with minimum grain sizes in the range of coarse gravel. Some of the riffles may be "armored" where a surface layer of coarse sediment cannot be moved by floods and the riffles are fixed against erosion. Gravel bars are "paved", composed of coarser bed material overlying finer sediments; however, they are mobilized by floods. Pools contain a range of sediment sizes from fine sand to coarse gravel. Well-vegetated bars have deep deposits of fine sands and silt; the result of vegetation increasing hydraulic roughness, slowing flow velocities and inducing deposition of suspended sediments.

In the Reach between the Healdsburg Dam and the Wohler constriction and backwater, the river flows with a positive hydraulic gradient. This area includes the North Levee and Middle Reach sites. The channel has typical dimensions ranging between 800 to 1,500 feet wide and 25 to 50 feet deep, and contains densely vegetated low floodplain areas. Alternating gravel bars range from 600 to over 2500 feet long and 80 to 350 feet wide. A 60- to 150-foot wide low flow channel meanders between gravel bars. The low flow channel has a pool, riffle, run morphology with major gravel riffles occurring at transitions between alternating gravel bars. Low terraces and gravel bars within the channel and channel banks are the few areas that support dense, mature riparian vegetation. The channel banks were very stable in the 1980s (only 3 acres of bank erosion reported between 1981 and 1986). However, instream extraction in the 1980s has probably reduced erosion by suppressing lateral channel migration. The channel has the capacity to carry floods up to about the 10-year event before flows move onto the higher floodplain areas of the valley floor. The 100-year floodplain covers most of the Valley floor from Healdsburg to the Wohler constriction at RM 24.5.

Below Highway 101, the west bank of the river is bounded by the levee haul road built in the 1940s and 1950s, which extends for four miles downstream. The levee is between 3 and 10 feet higher than the natural floodplain elevations to the west. It is protected by rip rap in some places as well as grouted embankments. The levee road has hardened the west bank of the river and limits lateral erosion and migration of the active channel in the westerly direction.

Above Healdsburg Dam, the Riverbend (Site 6) and the Healdsburg Bendway (Site 5) sites contain five alternating gravel bars, and a 150- to 300-foot wide low flow channel (see Figure 4.3-3). The City of Healdsburg sits on a high terrace to the north and west. Residential properties are located on terrace and floodplain areas to the north and south sides of the river. The Syar Industries aggregate processing plant and Healdsburg Veterans Memorial Park are located on the point bar at the Bendway. An artificial control on the channel bed and water levels upstream occurs at the Healdsburg Dam: a 15-foot high rock and concrete dam located between the Healdsburg bridge (built in the 1950s) and the Southern Pacific Railroad Bridge (SPRR) and U.S. Highway 101 (built in 1958).

The gravel bars upstream of Healdsburg Dam are without woody riparian vegetation, a consequence of being prone to frequent scouring and occasional gravel extraction. A comparison of historical aerial photographs shows that these bars migrate downstream during sediment transport, similar to the behavior of the bars in the Alexander Valley. This bar activity differs from the gravel bars downstream of Healdsburg Dam, where their position, and those of the

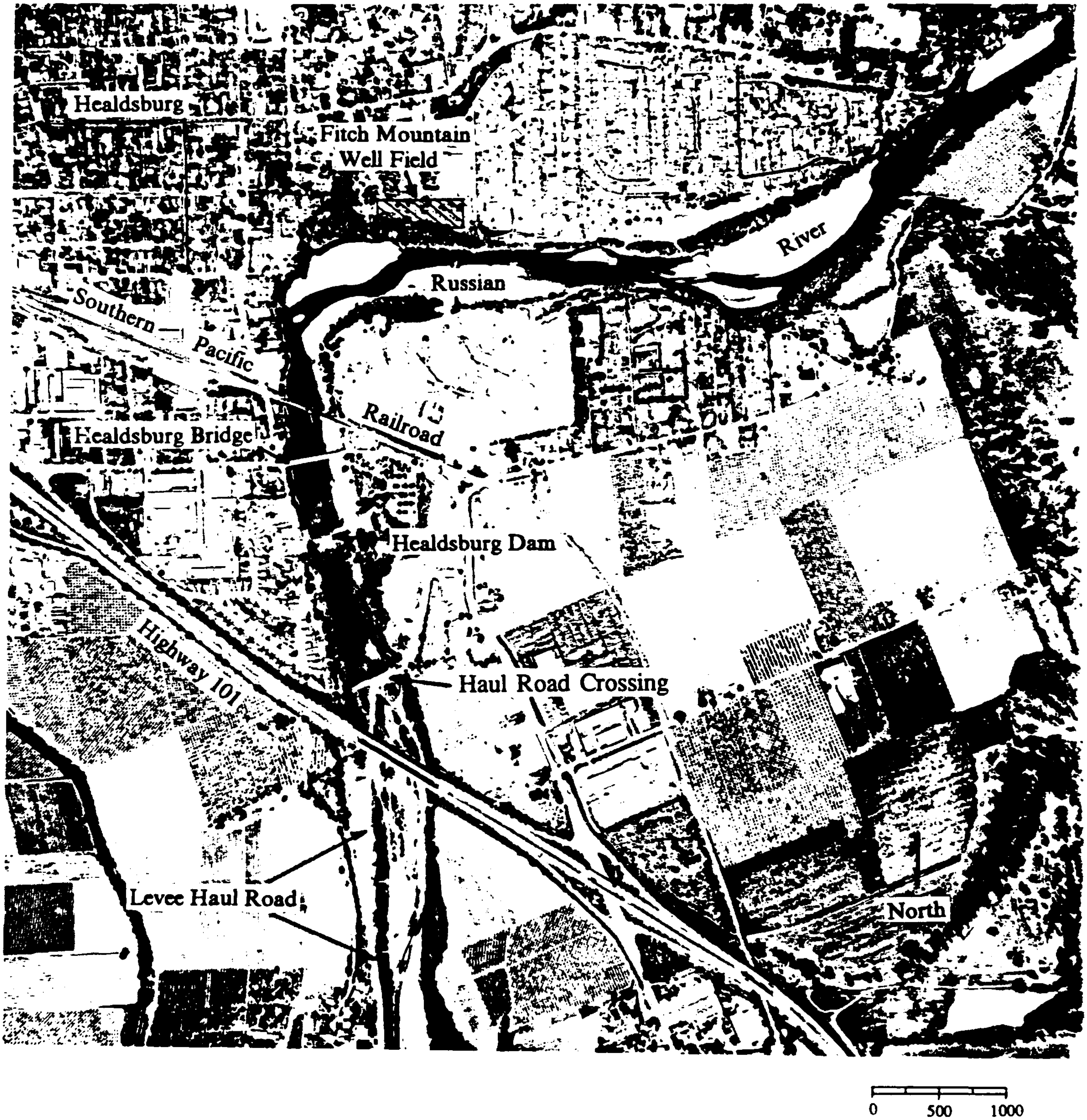

Figure 4.3-3

Aerial photograph of the Russian River in the vicinity of Healdsburg (RM32), showing the Healdsburg Bendway (Site 5), the Southern Pacific Railroad Bridge, the Healdsburg Bridge, and the Highway 101 Bridge.

riffles, are generally fixed. Woody riparian vegetation (willow, cottonwood and alder) often thrive on these downstream bars when left undisturbed.

Infrastructure in the Project Reach Including Healdsburg Dam

The infrastructure located within the influences of the project area includes bridges, private and municipal water supply wells, the Healdsburg Dam and temporary bridge crossings.

The bridges crossing over the project site are the Highway 101 Bridge at RM 31 (built in 1958), and the Healdsburg (built in 1920) and the Southern Pacific Railroad Bridges (built prior to 1945) located just upstream of the Healdsburg Dam (Figure 3-1). Other bridges that may be affected by the project include the West Side Road bridge over Dry Creek (built in the 1920s), and others downstream of the project site, including the Wohler Road Bridge (built in 1931), the Hacienda Bridge at Guerneville, and the Bohemian Highway Bridge at Monte Rio.

The Healdsburg Dam forms an artificial control on the channel bed just downstream of the Healdsburg and Southern Pacific Railroad Bridges. The present dam was built in 1952 for the primary purpose of holding flashboards to create a deep swimming pool in the summer months. It was originally constructed of vertical and angled batter piles (steel I-beams) capped by concrete. Subsequent damage due to erosion, undermining at the downstream end, and seepage was repaired in several phases in 1953, 1956, 1965, 1966, 1975, and 1982.[6] These repairs occurred during a period of major channel degradation (nearly 12 feet) at and downstream of the dam. The major repairs included a timber pile rock and clay core wing dam on the left bank (east) abutment after the December 1955 flood eroded a new channel around the left bank abutment, sheet pile bank protection behind the right bank (west) abutment after the 1964 flood, at least six individual rip rapping projects at the plunge pool below the downstream face of the dam, and a major structural and rip rap repair in 1982. The Healdsburg Dam is owned and maintained by the Sonoma County Regional Parks Department and inspected at least annually by the California Department of Water Resources Division of Dam Safety.

The Healdsburg Dam provides grade control for the river upstream of Healdsburg. It fixes the bed elevation by limiting the depth of scour and by reducing sediment transport until the sediments fill behind the dam. There is a 14-foot difference in bed elevations immediately above and below the dam. If the dam were removed, as some have suggested, to improve fish passage, the channel bed upstream would erode to smooth out the 14-foot drop or "*knickpoint* " and create an even longitudinal profile. This would cause an almost immediate bed degradation of 10-14 feet at the dam site, and degradation of at least several feet before the bed reaches resistant bedrock control in the channel upstream of the USGS stream gage at Bailhache (RM 35). This degradation would severely threaten the stability of the Healdsburg Bridge, the Southern Pacific Railroad Bridge and the banks along the river, and it would severely reduce the quantity of groundwater available to the City of Healdsburg's Fitch Mountain Well Field and private wells in the area.

Since its construction in 1955, the Healdsburg Dam has been repaired immediately after damage has occurred, or preventative repair work has been done. Present management of the dam is the same. The foundation of the dam consists of batter piles that have been driven to depths of 25

to 40 feet below the concrete cap. These piles have remained stable, and as of the early 1980s, have suffered little corrosion. The 1982 repair work substantially improved the stability of the structure by placing sheet piling across the upstream face to a depth of 20 feet and by placing an engineered filter layer below the rip rap at the downstream end to prevent seepage, erosion or piping. The rip rap on the downstream side of the dam has been placed to the depth of potential scour and is secured from downstream movement by a subsurface steel rail fence. The dam suffered very minor damage during the February, 1986, flood, a 20-year event with a peak discharge of 70,000 cfs, and flow depths over 20 feet above the dam; flow velocities likely exceeded 15 feet per second. The dam itself appears to be structurally sound and is deemed so by the State of California.

Although the dam structure appears to be sound, there may be potential for the river to erode around the abutments of the dam, as happened in the 1955 (east side abutment) and 1964 floods (western abutment). Major repairs after these floods have held; however, erosive pressures still exist. If the river did erode around the abutments, there would be little alternative other than to repair the banks and force flows back over the dam, since significant loss of property and severe channel instability would occur. If it were decided not to repair the dam, then the entire structure would have to be removed and the consequences of severe erosion and channel bed degradation upstream would need to be managed.

The Healdsburg Dam has been a source of controversy for fisheries management since the early 1970s, when it was found to be a significant barrier to anadromous fish passage. Widespread anadromous spawning grounds are located upstream of Healdsburg Dam on the upper Russian River and tributaries, yet upstream and downstream migration is limited under most, if not all, flow conditions at the dam. The California Department of Fish and Game (DFG) and concerned fisheries groups have pressured Sonoma County over the years to construct a fish ladder over the Dam. The County tried to improve fish passage with the rip rap placed in 1982, by raising the tailwater elevation at the dam. This effort apparently did not work. Sonoma County, under legal pressure to provide fish passage, recently proposed to remove the dam. This plan was recently found unacceptable by the State of California and by the City of Healdsburg due to the probability of severe environmental impacts. DFG has prepared a $1.3 million plan for a fish passage structure, and as of this writing, Sonoma County is reviewing this plan and a range of other options. It is assumed in this study that the dam will be managed in the future as it is presently.

Geomorphic and Land Use History

The Russian River in the project reach and the Russian River and Dry Creek drainage basins have undergone substantial modifications since the early 1800s, when European-style land uses were introduced. These changes have affected flow conditions, vegetation cover, channel form, and the geomorphic processes that influence the form and stability of the channel. A review of the history of land use and other impacts within these drainage basins is important to gain an understanding of the present geomorphic behavior of the Russian River and future trends, with or without implementation of the proposed project.

Evidence of the original, natural configuration of the Russian River in the Middle Reach area is found on historical aerial photographs and maps.[7] The original river had a shallow, wide channel and a sinuous braided pattern, similar to the channel found today in the Alexander Valley. This resulted from the long-term process of gravel deposition in the valley since the end of the Pleistocene epoch (10,000 years before present), which may have been countered by some incision caused by tectonic uplift along nearby faults. The valley floor flooded often, while the channel shifted position over a 2,000- to 3,000-foot-wide area. The channel apparently "avulsed", leaving abandoned oxbow channels, which were subsequently colonized by riparian vegetation (cottonwood and willow). The lower reach (RM 24.5 to RM 27) exhibited a broad meandering pattern with a sinuosity ratio of 1.45 (ratio of channel length to axial valley length).

Early land use changes occurred after 1850, when a substantial portion of the valley floors and foothills throughout the Russian River basin were converted from native forests and grasslands to agriculture and grazing lands. This conversion likely led to increases in storm runoff and delivery of sediment to the Russian River, particularly fine sediment eroded from soils. Many tributary streams that are incised within the valley floor were channelized and denuded. A study of the Holocene stratigraphy of Dry Creek[8] found that a period of fine sediment aggradation occurred in the 1880s.

By the turn of the century, nearly all of the valley floor in the Healdsburg area and Dry Creek was under cultivation and there were reports of damage and loss of land due to erosion, a consequence of developing too close to an actively migrating river.

The greatest geomorphic changes occurred after 1940, when intensive instream gravel extraction began on both the Russian River and Dry Creek. The primary extraction method on the Russian River was deep dredging of the channel. Historical accounts suggest that the river bed was dredged to a depth of 30 to 60 feet along the entire length from the Healdsburg Bend to the Wohler constriction. Historical aerial photographs from 1945 show that dredging had progressed from the Healdsburg Bend to the downstream side of the Dry Creek confluence (RM 29.5). The levee haul road on the west side of the river was extended as the dredging operation proceeded downstream. By 1952, dredging had progressed to RM 29, by 1958 to RM 27 near the Doyle Pit, and by 1962, excavation had progressed to a point 1,000 feet upstream of the Wohler Bridge (RM 23). The extraction practices included channelization and straightening, removal of riparian vegetation, levee construction, bar skimming, and stockpiling of sediments within the low flow channel. It is estimated that the total volume of gravel extracted from the Russian River channel between 1940 and 1972 was 21 to 25 million tons.[9] Instream dredging is visible on the 1968 aerial photographs and had reportedly ceased by 1972, when large-scale operations were moved to terrace pits along both sides of the river.

Extraction from Dry Creek was also intensive during this period. Simons and Li (1980) cite estimates of annual extraction rates as high as 400,000 tons per year, but other calculations suggest that it could have been lower, around 130,000 tons per year. Gravel operations on Dry Creek involved excavation of bars to depths of 4 to 6 feet. Vegetation removal from the banks was also common, as well as construction of bank protection works by various landowners.

After 1972, gravel extraction in the Russian River was limited to bar skimming and mining of low floodplain (e.g. Doyle Pit) and high floodplain areas. Gravel extraction in Dry Creek continued until about 1979. In 1979, Sonoma County implemented the Aggregate Resources Management Plan (ARM), which prohibited gravel extraction in the live low flow channel, but allowed bar skimming 1 foot above the summer water level.

The 1940 to 1972 in-channel excavation on the Russian River resulted in lowering of the channel bed by an average of 10 feet, and up to a maximum of 18 feet along the entire Healdsburg reach (Figure 4.3-2).[10] This incision confined the channel, causing it to develop a narrow, straight pattern. Many oxbow areas adjacent to the channel were used for gravel pits. Severe erosion, degradation and channel widening also occurred on Dry Creek during this period as a result of degradation of the Russian River by 18 feet at the confluence combined with continued gravel extraction and loss of riparian bank vegetation.[11] Aerial photographs from 1958 and 1963 show a large delta deposit of sediment, generated by the erosion and geomorphic adjustment, being mined at the mouth of Dry Creek in the Russian River.

By 1963, scour and degradation had exposed the support piers of the Highway 101 bridge over the Russian River. By 1971, the bed had lowered by 7 feet.[12]

A second phase of instream gravel mining on the Russian River began in 1980 with the implementation of the ARM Plan, which limited operations to bar skimming only and included annual monitoring of gravel extraction operations. During the 1980s, it was generally concluded that the degradation that had occurred between 1940 and 1972 had ceased by the mid-1970s.[13] Bar skimming occurred at least once on most gravel bars in the river between RM 28 and RM 33 during the 1980s with the extraction rate averaging 267,300 tons per year, and reaching as high as 455,000 tons in 1982. In 1986, Sonoma County contracted Simons, Li and Associates to review the monitoring data and assess the impacts of extraction. Simons and Li (1991) calculated that the long term annual replenishment rate for the project reach, including contribution from Dry Creek, was 284,000 tons per year, approximating the average extraction rate for the same period. Simons and Li (1991) found that there was slight degradation of the bed as represented by the changes in elevations of the "Low Point" (defined as the edge of water of the summer low flow channel) taken from photogrammetric surveys of gravel bars.

A review by Swanson and Associates and PWA (1992) of the Simons and Li (1991) report and 10 ground surveys (taken by Sonoma County) of complete channel cross sections (versus the photogrammetric surveys used by Simons and Li), which do not include ground point elevations for the portion of the channel that is under water) located between the Dry Creek confluence and the Wohler Bridge indicate that degradation of the channel bed had continued to occur throughout the 1970s and 1980s. Thalweg degradation ranged between 0.4 feet to 5.3 feet, and averaged 2.3 feet between the 1982 and 1986 surveys, even though major floods had occurred in 1983 and 1986 and gravel bars had aggraded. Volumetric changes between the cross sections for the 1982-89 period indicated an overall loss of 185,000 tons, or 36,000 tons per year, while extraction occurred at an annual rate of 164,000 tons per year.[14] Degradation occurred despite the high replenishment rates of the 1983 and 1986 floods, estimated to be over 530,000 tons by Simons and Li (1990), twice the calculated long term average annual replenishment rate of 284,000 tons per year.[15]

Caltrans maintenance records at Highway 101 indicate similar rates of continuing degradation through the 1980s, culminating in the greatest extent of degradation in a 1990 report. The net degradation at the Highway 101 bridge from 1959 through 1990 must account for the sum of all possible causes, including those induced by the constriction of the bridge structure, the angle of flow, bank protection works, the Healdsburg Dam and the twin box culvert used for a summer haul road crossing upstream. However, the decreases in bed elevation observed beneath the bridge through time have been within the same order (4 to 7 feet) as the bed degradation observed downstream, where bridge-related influences are not present. Given the similarity in the amount of recorded degradation throughout the Healdsburg reach, it cannot be ruled out that the majority of the degradation observed at the bridge is related to downstream degradation, and that bed elevations at the bridge are continuing to be influenced by bed changes downstream.

Some of the 1980s degradation may be a continuing response to the instream excavation that occurred in the years between 1940 and 1972, and perhaps the hydraulic effects of the Healdsburg Dam. However, instream gravel extraction during the 1980s cannot be ruled out as a contributor, since extraction rates exceeded average annual replenishment rates in five out of the ten years during this time (see Table 4.1 in Appendix C).

Comparisons of detailed longitudinal profile surveys conducted by Swanson (1991 and 1992) and the Sonoma County Water Agency[16] show 3 to 5 feet of channel bed degradation in the reaches above the influence of backwater caused by the Wohler constriction at RM 27.7. Within the backwater area, aggradation has occurred in areas where instream mining was underway in 1968. The comparison also shows that the depth of pools has apparently increased since 1968, even though riffle elevations have degraded up to seven feet. This would suggest that sediment scoured from the pools during floods is not being replaced, which may be an additional indication of sediment depletion.

The same 1991/92 thalweg profile data plotted with the CE 1940 and 1972, and 1980s survey data show a consistent downward trend (see Figure 4.3-2) the effect of more survey points on the profile resolution, and verifies the trend toward degradation.

Erosional History of the Healdsburg Bendway

The Healdsburg Bendway site consists of a 90-degree bend in the river channel from west to south as the river leaves Digger Bend and enters the Middle Reach. The main features at this site include three major gravel bars, a bluff on the outside portion (right bank) of the bend that is overlain by houses (some on fill) within the City of Healdsburg, and the Syar Industries processing plant, stockpiles and old siltation ponds, which lay on the floodplain on the inner portion (left bank) of the bend. Simons & Associates believe that substantial hydraulic modification of the bend is necessary to stabilize the "ongoing erosion" along the bluff on the outer portion of the bend.[17]

Local residents report that the Bendway bluff has been armored by rubble and fill from buildings demolished in the 1906 San Francisco earthquake. Concrete rubble is visible along the lower slope of the bluff at the low water edge downstream to the Southern Pacific Railroad tracks. A mobile home park and other properties have placed fill atop the bluff. In September of 1992 the

elevation of the gravel bar along the bluff edge varied in elevation between approximately 70 and 80 feet MSL.

The Healdsburg Bendway has experienced episodes of erosion since the first available aerial photograph was taken in 1945. Examination of this photograph shows that a low, well-vegetated terrace lined the entire outer portion of the channel in the Bendway at this time. The next subsequent photo taken in 1952 shows that this terrace has been eroded and replaced by a large gravel bar, and the bluff-line has been sculpted by erosion with the distinctive point still visible today. The 1952 photo also shows a significant constriction formed by in-channel berms and gravel stockpiles at the gravel processing plant. A choke point or hydraulic control (a narrow section of the channel) is visible between the distinctive point on the west bank and the gravel stockpiles at the gravel plant on the east bank. The 1952 photo clearly shows that the new bar was deposited in the backwater area behind the hydraulic control. Inspection of the recent 1991 aerial photograph shows the bar and the hydraulic control in the same position as they were in 1952.

The City of Healdsburg reports that bluff failure occurred at a mobile home park in 1983.[18] It is unclear whether this was a bank erosion failure or a mass failure of fill or natural bank material. It is possible that the reported bluff failure is unrelated to riverbank erosion. Overall, the configuration of the bluff and the hydraulics of the outer bank of the bendway have remained the same since 1952, and the City has not been compelled to treat the site for erosion problems.

Present Geomorphic Processes

Conditions on the Russian River have changed dramatically since the cessation of channel excavation in 1972, as the river continues to adjust to new equilibrium conditions. The channelization essentially converted the river from a wide, sinuously braided channel to a straight, fairly stable, single-thread active channel. This was accomplished by narrowing channel width, hardening the west bank with the levee haul road structure, shortening the channel meanders downstream, and flattening the channel gradient with excavation.

Historical data suggests that significant changes would occur in the Middle Reach with or without instream extraction. These geomorphic trends include fine sediment aggradation and riparian vegetation colonization of gravel bars, lateral bank erosion due to point bar formation, and lateral channel migration to establish greater active channel widths and greater channel sinuosity. These trends have considerable bearing on future management of the river and reflect a dynamism in the baseline conditions which must be projected into the future to predict the consequences of instream gravel extraction projects.

Based upon historical and field observations by Swanson and Associates and others who have monitored the Russian River over the past ten years or more (notably Biology Professor Phil Northern of Sonoma State University), the present geomorphic trend of the Russian River in the project reach is one that favors a positive feedback between vegetation growth on the bars and bar aggradation through deposition of fine sediment. This results in a narrower, deeper and more actively meandering channel. The stages of the bar building process and growth of riparian forest can be observed in space in the field, and through time at individual locations through

examination of aerial photographs. A gravel bar at RM 29 in the Middle Reach Project site was completely barren in 1972 due to channel excavation and bar skimming (see Figure 4.3-4). The surface of the bar was nearly level with the river low flow channel as evidenced by the small pond at the outer edge of the bar. By 1991, the bar is densely vegetated and has been elevated by sediment deposition to a low floodplain level; the low flow channel has become more complex and meandering in response to deepening of the banks (see Figure 4.3-5).

The bar-building process begins with the growth of willow and cottonwood seedings along the low flow channel. As the vegetation becomes established, it increases hydraulic roughness, reduces local flow velocities during winter flows, and induces fine sediment deposition. Vegetation continues to grow and colonize the new sediment deposit. In following years, the vegetation density increases, increasing fine sediment deposition and creating more areas across the bar for plant colonization. Through time these vegetated areas develop into clumps of vegetation bounded by overflow channels on the bar surface. Eventually, the clumps colonize the overflow channels and the process continues, with the bar aggrading by up to 10 or 15 feet above the original bar surface. Aggradation of bars through this process eliminates overflow areas previously used by the river during high winter flows and increases flow depths within the low flow channel, resulting in an increased ability to erode the low flow channel banks. Sediment that would normally be transported over the bar can accumulate in the channel and form islands, which become vegetated and cause a splitting and widening of channels. The channel eventually begins to erode the bar, creating steep banks and a meandering low flow channel.

A second geomorphic trend is the aggradation of point bars, lateral erosion and lateral channel migration when the flow is forced into the bank opposite the bar. Lateral erosion of the outer bank occurs as the channel counteracts the loss of flow area due to point bar aggradation. Point bar formation usually leads to an increase in channel sinuosity and meandering.

A third geomorphic trend is the increase in the activity of channel width and the sinuosity of the river's meandering pattern as it attempts to restore the morphology of the historical channel. In the reach upstream of the Doyle Pit (RM 26), channel pattern migration between 1979 and 1991 indicates that the channel is trying to restore its historical meandering pattern and width, which was altered by channel excavation in the 1950s and 1960s.

The processes described above promote a more diverse and varied channel topography and morphology, which creates more valuable riparian and aquatic habitats.[19] The processes promote vegetation growth over the channel which contributes to the formation of the deepest pools observed in the project reach, as well as water temperature regulation and cover for aquatic species. Alternatively, lateral erosion can result in the loss of low and high floodplain areas where either riparian forest or agricultural lands now exist.

Figure 4.3-4

Aerial photograph taken in 1972 of the detailed study reach (Middle Reach Site) located between RM 28.5 and RM 29.5 showing a freshly scoured bar surface.

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Figure 4.3-5

Aerial photograph taken in 1991 of the detailed study reach (Middle Reach Site) located between RM 28.5 and RM 29.5 showing colonization of the bar surface by woody riparian vegetation.

Point bar aggradation and channel migration can be suppressed temporarily by bar skimming. Skimming the point bar restores the channel flow area, and reduces erosional forces on the outside bank, slowing the process of meander formation. Bar skimming over the past 15 years has probably suppressed the natural geomorphic trends described above. Recent cessation of skimming has allowed the river to evolve and adjust to restore the equilibrium conditions it lost over the past 50+ years.

Channel and bank erosion on Dry Creek have been stabilized by the reduction of flood flows since the closure of Warm Springs Dam and armoring of the channel bed.[20] Pena Creek can still deliver sediment to Dry Creek; however, it may not be easily transported down Dry Creek to the Russian River due to reduced flows.[21]

IMPACTS AND MITIGATION MEASURES

Method of Analysis

An environmental impact analysis carried out under the requirements of CEQA and NEPA must identify ***potential*** impacts; therefore, the geomorphic impact analysis presented here should be considered conservative. A conservative study approach was requested by the key resource agencies (notably California Department of Fish and Game, Department of Conservation and U.S. Army Corps of Engineers Regulatory Branch San Francisco District).

Geomorphic impacts can affect conditions for other areas of impact concern, such as aquatic and terrestrial wildlife habitat, bridge stability, and groundwater supply and quality. Therefore, considerable communication between Swanson & Associates and those analyzing other impact areas occurred through a series of meetings, field consultations, and review. In some cases, environmental impacts resulting from a potential geomorphic change are identified and discussed in the section covering the resource of concern, for example fisheries or riparian vegetation.

The Sonoma County Planning Department conducted a review of its aggregate resource management element (ARM Plan) of the county General Plan concurrent with this study. Dr. Peter Goodwin of Philip Williams & Associates, Ltd. (PWA) was contracted to conduct the ARM plan geomorphic and hydrologic analysis and Dr. Yorim Rubin of UC Berkeley conducted the groundwater impact analysis. In order to avoid duplication of effort, Swanson & Associates worked closely with the PWA team during the study.

Prediction of geomorphic impacts or the future behavior of the Russian River must be based upon an understanding of the present sediment transport regime and historical changes that have altered natural equilibrium conditions. The configuration and geomorphic behavior of the Russian River, its channel and floodplain are largely dependent upon the movement of sediment through time. Important channel morphology factors, such as channel bed elevations, channel width, depth, longitudinal slope, and the elevation and extent of floodplain, are largely dependent upon the sediment transport regime of the river. The sediment transport regime in turn is dependent upon the volume of sediment supplied from sources in the Russian River drainage basin, the size characteristics of sediment, and the flow regime of the river - the frequency and magnitude of

flow events that move sediment in the river and perform geomorphic work (erosion and sediment deposition).

The geomorphic and hydraulic factors affecting sediment transport and supply can be changed through time by climatic change, or more recently, by the activities of humans. Under "natural" conditions prior to the early 1800s, and without the influence of human activity, the configuration of the Russian River reflected this natural, quasi-equilibrium balance between flow, sediment supply and channel and floodplain form. Fundamental changes in the key geomorphic factors that govern equilibrium have occurred with damming, water resources development, channelization, bridge construction, floodplain development, bank erosion control, conversion to agriculture, and gravel extraction. Altering geomorphic variables can cause immediate changes to the equilibrium condition, for example removing or "skimming" a gravel bar creates a wider channel and can induce greater sediment deposition. Some changes may take considerable time to fully develop; for example, removing gravel may reduce the sediment supply and transport to a point where flows begin to remove sediment from the channel bed or banks and the channel deepens and widens during large floods. Since large floods occur fairly infrequently, it may take a series of floods over a period of years or decades for the channel to adjust to the new equilibrium condition. Therefore, careful documentation was made of historical practices, geomorphic changes, aforementioned geomorphic trends, such as the rate of bed lowering or ***degradation***, and how such trends may occur in the future, even without the proposed project.

Historical information was gathered and analyzed through review of existing reports, maps, surveys and aerial historical photographs and accounts covering the period 1900 to present. Historical aerial photographs were obtained for a number of years: 1945 (partial coverage), 1952, 1958, 1962, 1967, 1972, 1979, 1981, 1986, 1990 and 1991. Historical topographic survey data was obtained from the U.S. Army Corps of Engineers San Francisco District, Caltrans, the California State Lands Commission, the Sonoma County Water Agency, and the Sonoma County Planning Department. Data and results from previous studies by Simons, Li and Associates (1980 and 1991), U.S. Army Corps of Engineers (1972), Simons and Associates (1987 and 1991), Sonoma County Water Agency (1972), WET (1987), and Curry (1990, 1991, and 1992) were examined.

Geomorphic and land use features were mapped from historical aerial photographs (1945, 1952, 1958, 1962, 1967, 1979, 1986, and 1991) onto enlarged U.S Geological Survey topographic base maps at a scale of 1 inch = 500 feet (1:6000) using a Bosch and Lomb Zoom Transfer Stereoscope. These features include the low flow channel, the active channel as defined by evidence of recent sediment transport, gravel bars and gravel extraction areas in the river and on the floodplain.

Literature was reviewed to assess gravel extraction impacts identified in other settings and their relevance to the Russian River. These sources included Collins and Dunne (1990) and Chang (1988).

Predictions of sediment transport rates and supplies was drawn from a series of previous reports (Simons and Li, 1990 and 1980; USGS, 1974; Simons and Associates, 1987; Harvey, et al, 1987), published data (USGS, 1986 and 1987; USGS, 1972; Swanson & Associates, 1992), and pertinent

literature (Chang, 1988; Dunne and Collins, 1990; Simons and Senturk, 1992; Vanoni, 1977). The findings of these reports are discussed in Appendix C.

Field work was conducted in the summer of 1991 and the Spring of 1992 to collect topographic, geomorphic and sediment grain size data for the project reach. This data was used to increase the resolution of data collected by Syar Industries, Inc., Simons and Li (1991), the Sonoma County Planning Department and the Sonoma County Water Agency. A longitudinal elevation profile of the channel thalweg was surveyed by auto-level survey using benchmarks established by Sonoma County and the U.S Coast and Geodetic Survey for Standardized National Geodetic Vertical Datum (NGVD) or MSL of 1929 elevation control. Deep portions of the channel were sounded from a boat using a survey rod and depths subtracted from water surface elevations. A detailed study reach was established at RM 28.5 to 29.5 to contrast the characteristics of a recently skimmed bar, and a relatively undisturbed bar. Detailed sediment grain size measurements and cross sections were taken.

The evaluation of instream mining impacts used here takes into account the recommendations of Collins and Dunne (1991), which were based upon a review of case studies. They suggest that several factors be analyzed when assessing past or future impacts of gravel mining from bars and/or the low flow channel bed of gravelly river channels. These factors include:

1) Extraction of bed material in excess of replenishment from upstream sources causes bed degradation. Degradation can extend upstream or downstream of an individual extraction operation, and can result from mining of the bed either in or above the low water channel.

2) As a result of bed degradation, bridge supports can be undermined, and pipelines or other structures buried within river beds can be exposed.

3) Bed degradation may changes the morphology of the river channel, which could affect aquatic habitat and salmonid spawning sites.

4) Degradation can deplete the entire depth of gravel on a channel bed, exposing other substrates that may underlie the gravel, which in turn may affect aquatic habitat. The potential for gravel depletion depends upon the thickness of gravel deposits above another substrate.

5) If a floodplain aquifer discharges into the stream, groundwater levels can be lowered as a result of channel degradation. Lowering of the water table would reduce aquifer storage capacity, increase depth to groundwater, and drain wetlands, but enhance some uses of seasonally saturated soils where groundwater levels are near or at the ground surface.

6) Lowering the groundwater table can destroy riparian vegetation in the short term. Eventually vegetation can recolonize lower elevation banks as they are exposed. Destruction of riparian vegetation in turn adversely affect fish and wildlife habitat. In streams where vegetation acts to stabilize banks, bank erosion may be increased as a result of vegetation destruction.

7) The frequency and magnitude of overbank flooding are lessened as bed elevation and flood heights decrease, reducing the hazard for human occupance of floodplain areas and the chances of flood damage to bridge spans. Therefore, gravel extraction to increase flood capacities of channels may be part of a program for flood control.

8) Rivers migrate across the floodplain by eroding the outside bank of a bend and depositing material on a point bar on the inside bank. With time the gravel bar on the inside of the bend is covered with fine sediments and organic materials from overbank flooding, eventually making the soils suitable for riparian vegetation. However, if the accretion occurs while the river bed is rapidly lowering, the accreted land will be stranded above the active floodplain as a terrace. Newly arrested or existing floodplain may no longer be supplied during floods with water and fine, organic-rich sediments, which are important for some agricultural land uses.

9) Rapid bed degradation may induce lateral erosion by increasing the height of banks, which are then more prone to undercutting and failure.

10) The reduction in size or height of gravel bars can cause either the erosion or the stabilization of upstream and downstream banks. The existence of the point bar tends to force the current toward the opposite bank, undermining it. Removal of the point bar therefore may stabilize the opposite bank. However, lowering of the point bar may also have a destabilizing effect on banks as a greater portion of the flow follows a more direct path downstream, increasing the erositivity of the river on the outside bank of the next bend downstream. Prediction for particular river bends requires careful field study of the geometry and hydraulics of the specific bends.

11) Removal of gravel from bars may cause erosion of downstream bars by interrupting the supply of gravel to them while the river maintains its capacity for transporting gravel from them.

12) Some dredging operations result in the preferential removal of gravel from mixed sand and gravel beds. Lagasse and others (1980) suggest that a reduction in gravel supply in such a river can affect channel stability, because bars, which are armored by gravel, could be destabilized as a result of the decrease in gravel supply. Lagasse and others (1980) speculate that an increase in the number of divided flow reaches in the lower Mississippi River may have stemmed in part from an observed decrease in bed material size. The possible effect is relevant to few perennial rivers of the Pacific states, because extraction operations usually do not preferentially remove coarser particles from the bed.

Chang (1988) attributes changes in channel morphology (width, depth, slope) and bed material sediment composition after gravel extraction to nonuniformities in sediment transport hydraulics caused by the extraction operations. The degree to which adjustments occur is related to the degree of nonuniformity that the mining operation creates.

Many other investigators have researched instream gravel mining impacts to Northern California streams [e.g. Cache Creek in Yolo County[22], upper Russian River in Mendocino County (DWR, 1984); Stony Creek in Glenn County[23]], finding that one or several of the impacts described above have occurred due to gravel extraction.

Technical analyses were performed by Swanson & Associates to evaluate sediment replenishment rates and gravel excavation rates, and to assess the potential for future channel bed degradation. The methods employed by Swanson & Associates, as well as the results and conclusions of the studies, are detailed in Appendix C of this Draft EIR/EIS.

Standards of Significance

The standards of significance are used to determine whether an impact is significant and the extent of mitigation necessary to reduce the impact to a less-than-significant level. Whenever possible, it is desirable to quantify the significance.

Determination of impact significance thresholds on the Russian River is complex and difficult because the river is a dynamic system that may be subject to significant hydrologic and geomorphic changes in the future under existing baseline and no-project alternative conditions. This is because the river may still be adjusting to all of the manipulations that have occurred over the past 50 years, and because channel forming floods occur infrequently. For example, the river may continue to degrade without any gravel extraction as a result of continuing adjustments to past human actions. Also, lateral erosion may accelerate without instream mining, which may damage floodplain lands used for agriculture or covered by riparian forest; this may eventually require bank protection efforts.

Besides these geomorphic changes, the management of the river is likely to change from the practices of the past 12 years. The most significant change is the recent reduction or elimination of instream extraction in management of the river in comparison with the 1980s, which apparently depleted sediment supplies within the Middle Reach. Extraction in the 1980s may have suppressed lateral erosion in the river, thereby keeping it within a straight and narrow pattern. Without skimming, field and historical observations described above indicate that point bar aggradation and vegetation growth will likely accelerate, resulting in loss of flow area which is either compensated for by lateral erosion, to maintain flow area, or reduced flood capacity.

It is not possible with existing information to predict precisely what the geomorphic results would be without the project. The geomorphic trends identified will interact in a manner that has not occurred historically, and therefore has not been measured. Degradation may continue to occur in order to decrease channel slope; however, lateral erosion and increased channel sinuosity will also decrease slope, perhaps to a point where degradation will not occur. Also, channel bed degradation does have a depth limit and cannot extend below a point where the river does not have positive slope downstream. No data exists to document what the results of the baseline processes would be. The Middle Reach below Healdsburg Dam has experienced intensive gravel extraction over the past 50 years, well beyond the rate of replenishment. There are no data available to determine how the river would recover without gravel replenishment.

For significance criteria, the magnitude of impacts caused by an alternative must be measured primarily by gravel extraction rate versus actual gravel supply. The proposed rate of extraction will be measured against the best estimate of annual replenishment (130,000 tons per year). The significance of the impact will be measured by the potential gravel deficit that may occur. A discussion of other studies of sediment replenishment rates appears in Appendix C.

In addition, a geomorphic impact is deemed significant if the proposed action changes the sediment transport regime of the river to an extent that results in a changed physical shape, size or form of the river channel or floodplain, affecting the performance or stability of structures (such as bridges).

Project Impact

4.3-1 Gravel extraction would cause and/or accelerate channel bed degradation below the Healdsburg Dam.

Historical evidence shows that gravel extraction rates averaging 164,000 tons per year between 1981 and 1989 contributed to an average 2.3 feet of channel bed degradation (0.4 to 5.3 feet) on the Russian River in the project reach. This occurred with the present conditions on the river with management by Sonoma County Planning Department, which limited gravel extraction to bar skimming. The historical information indicates that the long-term average annual replenishment rate or "safe yield" that can be extracted without changing the morphology or bed elevation of the river is approximately 130,000 tons per year. This amount will vary year-to-year, depending upon climate, the magnitude of sediment transporting floods, the rate of gravel extraction upstream, and/or sediment supplied from the watershed by landslides.

A-1 The No Project Alternative would not create a substantial degradation impact since it is unlikely, but not entirely out of the question, that bed degradation would occur without instream mining. The geomorphic adjustments resulting from past mining extraction may continue into the future, but it is not likely that it would be a significant change or create substantial problems for present management. Bed degradation may be moderated by increases in channel sinuosity and length. If bed degradation were to occur, it would likely be greatest below the Healdsburg Dam and above the Wohler Constriction backwater area (RM 24.8). This is considered a ***less-than-significant impact.***

A-2 The Proposed Project would cause or accelerate bed degradation by extracting gravel at rates greater than replenishment (approximately 120,000 to 250,000 tons per year greater) and by possible headward erosion from excavated portions of the channel in the Middle Reach, Healdsburg Bendway and Riverbend sites. The impact would probably be greatest below the Healdsburg Dam, especially in the North Levee Haul Road site (Site 4). The extraction rates above the Healdsburg Dam would also exceed average supply. Bed degradation would be less at the South Levee site since it is within the backwater area above the Wohler constriction. The magnitude of the gravel deficit (120,000 to 250,000 tons per year) is 3 to 7 times higher than the magnitude of the 1980s gravel deficit (36,000 tons per year). It is therefore reasonable to estimate that potential average degradation resulting from the initial five-year extraction period could be between 5 to 7 feet over the reach between the Healdsburg Dam (RM 32) and the Wohler constriction backwater area (RM 28). If the extraction period occurs during a dry period without replenishment, the actual deficit could be greater. After the initial five-year period, it is anticipated that extraction rates would decline to include only bar skimming and channel pool maintenance; however, the rate of extraction could still exceed supply by up to at least 200,000 tons per year, depending upon replenishment. Given the magnitude of the deficit below Healdsburg Dam and the uncertainty of replenishment, it is reasonable to assume a long-term degradation impact of 3 to 5 feet.

Dry Creek could experience renewed degradation if the level of the Russian River at the confluence were lowered. However, since flood flows in Dry Creek have been

significantly reduced by regulation at Warm Springs Dam, to one sixth of their pre-dam magnitude, the rate of degradation should be less than the Russian River, perhaps 1 to 3 feet.

This is considered a ***significant and unavoidable impact.***

A-3 Alternative 3 would also cause substantial channel bed degradation, since the proposed extraction rate would exceed the average 1980s gravel deficit in an individual year by 70,000 to 200,000 tons, or 2 to 5.5 times. The impact of Alternative 3 would be less than Alternative 2 since the magnitude of the deficit is less, and there is less potential for headcutting since no channel excavation is proposed. However, it seems reasonable to assume that Alternative 3 could cause 3 to 5 feet of degradation. This is considered a ***significant and unavoidable impact.***

A-4 The Limited Bar Skimming Alternative would not cause or accelerate bed degradation, because gravel removal would be more tightly managed, and would occur at the actual rate of replenishment and within the Wohler constriction backwater area at the South Levee Haul Road. This is a ***less-than-significant impact.***

A-5 The Streamway Alternative would not cause or contribute to bed degradation since there would be no instream mining. There is a possibility that this alternative would induce bed aggradation in localized reaches due to the expansion of channel flood capacity, the concurrent decrease in flow velocities and loss of sediment transport capacity. This is considered a ***less-than-significant impact.***

Mitigation Measures

4.3-1 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.3-2 Increased bed degradation could affect the structural stability of bridges and the Healdsburg Dam.

A-1 Bed degradation may occur in the future without a project as a result of continuing geomorphic adjustment to past instream mining. This impact is not significant at the most vulnerable bridge, Highway 101, since present management practices include Caltrans plans to either replace the support piers or the entire structure, and design for 15 feet of local scour and 5 feet of future degradation.

The impact on the Healdsburg Bridge and the Southern Pacific Railroad Bridge is not significant since the riverbed under these structures has been stabilized by the Healdsburg Dam.

The impact of future bed degradation with Alternative 1 would not be significant at the Westside Bridge over Dry Creek since the bed is apparently stable with the reduced flood releases from Warm Springs Dam, vegetation on the bed and armoring of channel bed. Whatever the future effects due to degradation, the Westside Bridge would continue to be monitored for stability, and action would be taken to stabilize or replace it if it became unstable.

The Healdsburg Dam would likely continue to experience periodic damage due to erosion, scour and degradation with Alternative 1, and would require periodic repairs, as it has over the past 40 years. The present management system is designed to keep the dam in place. There appears to be little chance for complete failure of the structure since the foundation pilings are seated 20-30 feet below the river bed, the concrete pile cap is tied to the numerous pilings, and the bank protection structures built behind the dam abutments are stable. The rip rap on the downstream end is well-placed, well-engineered and apparently stable. Extensive repairs were made prior to 1970 when the channel bed dropped 12-14 feet in the plunge pool below the structure. The structure experienced little or no significant damage after the large February, 1986, flood and is considered sound by the State of California Division of Dam Safety.

If the structure were significantly damaged there would be two choices: 1) Fix the dam and restore its function as a grade control; or 2) completely remove the structure and deal with significant and expensive impacts (e.g., well production losses at the Fitch Mountain Well Field, bridge damages, and bank failures). The structure cannot be abandoned if it were partially damaged, because it would present a significant erosional hazard to property, and possibly a danger to recreational users.

These impacts are considered ***less than significant.***

A-2 and A-3

As described above, substantial degradation may continue under existing conditions. The Proposed Project would exacerbate bed degradation, worsening the effects on the US Highway 101 Bridge and at the Westside Bridge over Dry Creek. These bridges are already seriously undermined by channel bed degradation. At Highway 101, exposure of the pier support footings and underlying pier pilings grew progressively worse through the 1970s and 1980s. Caltrans, the agency in charge of maintaining the 101 bridge, has found that the bridge is subject to failure in the event of design flood (100-year flood), and is also a seismic hazard due to instability of piers and footings. Caltrans is planning the replacement of the bridge support piers or the entire bridge. This structure would be designed for 15 feet of local scour and 5 feet of future degradation. Depletion of sediment supply by instream extraction, particularly immediately above (Sites 5 and 6) or immediately below (Sites 3 and 4) the bridge would cause and/or accelerate channel bed degradation, and result in more difficult and costly design conditions.

The West Side Road Bridge over Dry Creek may be affected by any channel bed degradation occurring at its confluence with the Russian River. This bridge is already seriously undermined.

Other bridges within the project reach, the Southern Pacific Railroad Bridge and the Healdsburg Bridge, should not be affected, since both of these structures are upstream of the Healdsburg Dam and appear to have stabilized. Thalweg elevations at the Healdsburg Bridge increased from 64.5 feet to 66 feet after construction of the Healdsburg Dam in 1952. The minimum bed elevation has remained near 66.0 feet despite extensive channel excavation and bar excavation in the area upstream of the dam between 1952 and 1979, and large floods in 1958, 1964 and 1986. The SPRR and Healdsburg bridges were exposed to degradation prior to the construction of the Healdsburg Dam in 1952, and experienced damage due to degradation. Steel sheet piling has been placed around the Healdsburg Bridge and the SPRR support piers.

These are considered ***significant impacts.***

A-4 The impact of Alternative 4 on bed degradation and bridge stability is similar to Alternatives 1 and 5. Mining would occur well downstream of bridges, and gravel supplies would not be depleted. The rates of extraction would be no greater than the volume actually replenished to sites located in the backwater area near the Wohler constriction. Therefore, the local sediment storage would be depleted. Bridges would be stabilized if needed with present rates of degradation. *This is considered a **less-than-significant impact.***

A-5 The impact of channel bed degradation on bridges would be the same as Alternative 1, since there is no instream extraction, and the bridges are either stable or will be repaired with present rates of channel bed degradation. This is a ***less-than-significant impact.***

<u>Mitigation Measures</u>

Implementation of either Mitigation Measure 4.3-2(a) or Mitigation Measure 4.3-2(b) would reduce the impacts of Alternatives 2 and 3 to a *less-than-significant level.*

4.3-2(a) *Modify the Highway 101 and Westside Road bridges so that they maintain structural stability in light of anticipated channel bed degradation. This measure would be required for Alternatives 2 and 3.*

The impact on the Highway 101 Bridge could be reduced to less than significant if the pier support footings were constructed at a greater depth. Caltrans plans to replace the pier supports and construct the footings to a depth of 15 feet below the present minimum bed elevation (10 feet for local scour plus 5 feet for degradation).[24] The impact of Alternatives 2 or 3 would be reduced to a less-than-significant level if the project applicant contributed the cost of placing them at 20-foot depth (5 additional feet to account for project-related degradation). The estimated cost of this mitigation measure is $0.55 million, which would be paid for by the project proponent.

4.3-2(b) *The proponent shall pay to install sheet piling around the affected support pier footings and abutments, to a depth that exceeds the potential depth of scour during a design flood, or use other proven measures to stabilize the West Side Bridge. This measure would be required for Alternatives 2 and 3.*

The feasibility of any potential stabilization of the West Side Bridge is subject to Caltrans and Sonoma County approval.

Project Impact

4.3-3 Degradation could destabilize channel banks causing loss of floodplain property between the Riverbend site and the bedrock control at the USGS Bailhache gage (river mile 35).

A-1, A-4 and A-5

Alternatives 1, 4 and 5 would not cause this impact since no mining operations are proposed above the Healdsburg Dam. Therefore, this impact is considered ***less than significant***.

A-2 and A-3

Degradation induced by extraction above replenishment rates under Alternatives 2 and 3 would increase channel bank heights between the Healdsburg Bendway and the bedrock control at river mile 35. Steepening of banks could lead to their failure with an associated loss of floodplain, property and riparian forest. This is a ***significant and unavoidable impact***.

Mitigation Measures

4.3-3 None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.

Project Impact

4.3-4 Bed degradation and the excavation of pools below Healdsburg Dam would steepen the channel banks and reduce their stability, causing increased bank erosion.

A-1, A-4 and A-5

Since increased streambed degradation is not anticipated under these alternatives, this is considered a ***less-than-significant impact***.

A-2 and A-3

Stream bed degradation can cause or accelerate lateral erosion of a channel bank by undermining its base and increasing bank height. The floodplain areas susceptible to failure are covered with either riparian or agricultural land. Once the bank fails, it will not be feasible to replace it, since it is likely to become part of the active channel. Since both of these alternatives would increase bed degradation, this is considered a ***significant and unavoidable impact.***

Mitigation Measure

4.3-4 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.3-5 Excavation of the Doyle Pit below the elevation of the River bed, and subsequent loss of the bank between the river channel and pit due to lateral erosion, could lead to capture of the river channel into the pit, and significant upstream degradation and erosion.

A-1 and A-5

Alternatives 1 and 5 would allow for the greatest meandering. The present depth of the Doyle Pit appears to be approximately the same as the river bed.[25] Therefore if capture occurred, it would disrupt the stream morphology over a short term in the local reach and would not cause headward erosion. This is considered a ***less-than-significant impact.***

A-2 through A-4

Excavation of the Doyle Pit as proposed in Alternatives 2, 3, and 4 would result in pit elevations well below the Russian River channel, perhaps 10 to 30 feet or more. The Russian River in this reach, prior to channelization and excavation in 1962, was a highly meandering channel. Recent bank erosion just upstream of the Passalacqua Pit and along the Doyle Pit suggest that the river channel may be attempting to restore its original meandering wave amplitude, which was substantially greater than that which exists today. Erosion in this area could continue well into the future as the river adjusts to a new equilibrium from the channelization of the early 1960s.

Conventional bank protection will not stabilize banks on a morphologically unstable evolving, meandering channel. The river requires more width in this area to establish a meandering pattern similar to the original. The original meander wavelength amplitude was approximately 1,400 feet in 1952, whereas after channelization it was straightened to the present 400 feet (see Figure 4.3-6). The present river is likely trying to find an intermediate amplitude. Meander loops are not stationary features through time, even when a stable meander curvature and wavelength is established. Therefore it is not feasible to place bank protection structures in one place and stabilize a set pattern where

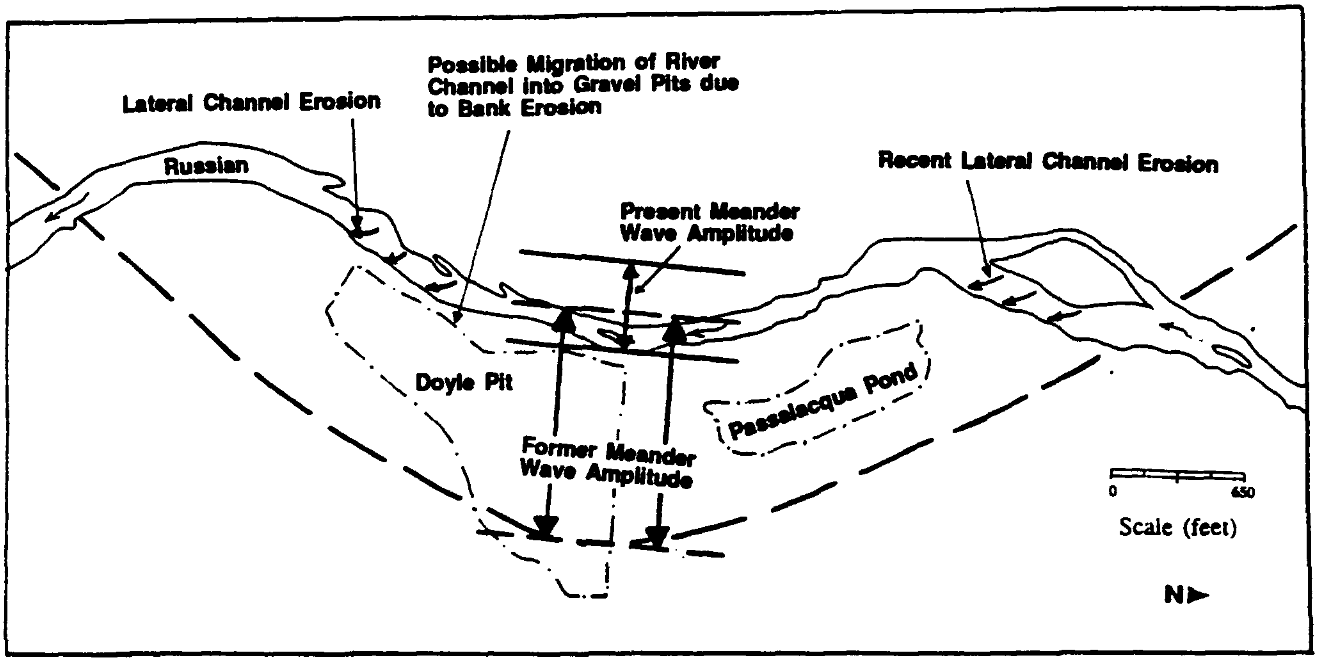

Figure 4.3-6

Map of the Doyle Pit Site on the Middle Reach of the Russian River showing the historical and present meander wave amplitude and areas of recent bank erosion.

geomorphic conditions (slope, sediment load and past disturbances) dictate dynamic change in the near and distant future.

At higher flows, the Doyle Pit would be filled with groundwater, which generally maintains the same elevation as the river, and stormwater. Under these backwater conditions, capture of the river may not create much, if any, headward erosion. However, present hydraulic information does not indicate what flows would create a backwater effect. It is possible that at moderate discharges (25-40,000 cfs) the channel would capture the pit, resulting in headward erosion because of the 10- to 30-foot fall from the channel to the bottom of the pit. Therefore, this is considered a ***significant and unavoidable impact.***

Mitigation Measures

4.3-5 *None required for Alternatives 1 and 5. None available for Alternatives 2 through 4.*

Project Impact

4.3-6 Implementation of some of the alternatives could reduce flood capacity in the river, thereby increasing the extent or depth and severity of flooding above the Healdsburg Dam.

A-1, A-4 and A-5

Under these alternatives, mining would not occur above the Healdsburg Dam; therefore, gravel bars could increase in height and volume, and reduce channel flow area. Considering the sediment transport processes of scour and bed lowering during floods, this rise would be relatively small. Any property within the 100-year floodplain would experience a slight rise in flood elevations. In those few areas where the topography is relatively flat, there could be a slight expansion in the floodplain. However, based on aerial photographs, U.S.G.S. topographic maps and the FEMA 100-year flood maps for the City of Healdsburg and Sonoma County, there do not appear to be any sturctures that would be affected by these changes. Therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

Under the Proposed Project and the Gravel Bar Skimming Alternatives, bars would be skimmed and 16-foot pools would be excavated above the Healdsburg Dam. While this would increase the capacity of the river channel by removing gravel and causing channel bed degradation, the Healdsburg Dam and constrictions immediately upstream greatly control flood levels. Based on existing information, it appears that, for the reasons stated above, that the reduction in flood levels would be slight. Therefore, this is a ***less-than-significant impact.***

Mitigation Measures

4.3-6 *None required.*

Project Impact

4.3-7 Flood inundation frequency and depth could increase below the Healdsburg Dam.

A-1 and A-5

Flood inundation frequency and depth could increase due to aggrading gravel bars and vegetation growth. However, downstream constrictions would not be changed under any of the alternatives; therefore, flood levels would not increase substantially. This is considered a ***less-than-significant impact.***

A2 through A-4

Some gravel bars would not be allowed to aggrade under these alternatives, and the downstream constrictions would not changes. Therefore, flood levels would not increase. This is considered a ***less-than-significant impact.***

Mitigation Measures

4.3-7 *None required.*

Cumulative Impact

4.3-8 Instream extraction in the project reach would add to the accumulated sediment budget deficit in the Russian River Basin resulting from instream extraction upstream, and from loss of sediment source areas by damming. This could result in bed degradation downstream and possibly accelerated bank erosion in the project reach and downstream of Wohler Bridge.

A-1 and A-5

No instream gravel extraction is proposed for these alternatives. This impact, therefore, is considered ***less than significant.***

A-2 and A-3

Proposed instream extraction for these alternatives would exceed the annual replenishment rate and exacerbate the sediment deficit. The downstream degradation could cause damage to the Wohler Hacienda and Monte Rio (Bohemian) Highway bridges where degradation occurred in response to extraction prior to 1971. This impact is considered ***significant and unavoidable.***

A-4 Instream extraction would not exceed the annual replenishment rate. Therefore, this is a ***less-than-significant impact.***

Mitigation Measures

4.3-8 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Beneficial Impact

Bar skimming arrests point bar building and lateral erosion. Alternatives 2 and 3 would have these benefits; although, it may be offset if bed degradation is induced and bank heights increase.

The benefits of the spurs for stability of the Healdsburg Bluff are tenuous because the bluff has been stable and in its present configuration since 1952. It has also endured major floods in 1955, 1964, 1983 and 1986.

ENDNOTES

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3. Philip Williams and Associates, 1992. *Hydrologic Aspects; Aggregate Resource Management Plan Update and EIR*. Report to Sonoma County Department of Planning and EIP Associates, San Francisco.

4. Ibid.

5. U.S. Geological Survey, 1986. *Flow and Sediment Data for California, Volume 2*. U.S. Geological Survey, 1985. *Flow and Sediment Data for California, Volume 2*. U.S. Geological Survey, 1972. *Flow and Sediment Data for California, Volume 2*.

6. California Department of Water Resources, Division of Dam Safety.

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10. U.S. Army Corps of Engineers, Survey data for Russian River, San Francisco District, 1972.

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13. Robert Gaiser, *Senior Planner*, Sonoma County, personal communication, June 11, 1991.

14. Philip Williams and Associates, Op cit.

15. Simons, Li and Asscciates, Op cit.

16. Sonoma County Water Agency, 1968. Survey of Russian River data.

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18. Bob Robertson, City of Healdsburg Public Works Dept., personal communication, September, 1992.

19. Larry Wise, ENTRIX, personal communication, 1993; Rick Hanson, EIP Associates, 1993.

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21. Simons and Li, 1980, Op cit.

22. Woodward Clyde Consultants, 1976. *Aggregate Extraction Management Study, County of Yolo, California*. Report to the County of Yolo Planning Department, Woodland, CA.; Environ, Inc. 1980. *Draft EIR on Sand and Gravel Operations along Cache Creek Between Capay and Yolo*. Report to Yolo County Planning Department, Woodland, CA.

23. Swanson and Kondolf, 1992. *Geomorphic Study of Bed Degradation in Stony Creek, Glenn County, California*. Report to Caltrans, Division of Structures, Sacramento, CA.

24. Caltrans, Catherine Crossett, Hydraulic Engineer, Division of Structures, August 25, 1992, personal communication, 1992.

25. Syar Industries, Tal Baily, Personal Communication, July 1, 1991.

4.4 SURFACE WATER QUALITY

4.4 SURFACE WATER QUALITY

SETTING

Surface Water Quality

Surface water quality has been investigated by Ritter and Brown,[1] who investigated turbidity and suspended sediment problems and their causes on the Russian River Basin, and Department of Water Resources.[2] USGS collects water temperature data at four gaging stations in the Russian River, and a full set of water quality data at the Guerneville gage, including chemical, biological and physical parameters (temperature and sediment discharge).

Turbidity has been a persistent problem in the Russian River. Although Ritter and Brown found that turbidity was generally related to stream borne sediment discharge and diversion of turbid water from the Eel River Basin, instream gravel mining is a possible cause of turbidity measured at the Guerneville gage.[3] However, this must be placed in perspective, since the intensity of instream mining was substantially greater during their period of USGS study (1964-68).

DWR measured water quality parameters in the study area and found that there were no significant differences in the quality of groundwater.[4] Their samples showed that surface water was moderately hard and met water quality criteria for all general uses.

IMPACTS AND MITIGATION MEASURES

Method of Analysis

Water quality data on the Russian River was gleaned from existing reports.[5,6] Information on potential impacts was gathered through discussions with municipal water purveyors.

Standards of Significance

A water quality impact is considered significant if the alternative would degrade the quality such that it could not be used for its present use, or if additional filtration would be necessary to make it acceptable for present use above what is and will be necessary to develop and maintain supply. It is also significant if it would threaten aquatic life or degrade habitat.

Project Impact

4.4-1 Instream extraction within or near the live stream would result in the release and concentration of fine sediments and turbid water during the summer low flow or during the first flows of the winter flood season.

Historical aerial photographs of past extraction operations in the channel show that fine sediment can be released from in-channel extraction areas, even though a berm has been placed around the extraction area. Ritter and Brown (1971) identified instream gravel extraction as a source of fine sediment and turbidity during their investigation (1964-1968) in the project reach.

A-1 and A-3 through A-5

Alternatives 1, 3, 4, and 5 would not result in this impact because they do not involve channel and bar excavation below the summer low water elevations.

A-2 Alternative 2 could cause degradation to water quality by releasing fine sediments from instream pool and bar excavation sites at Riverbend, Healdsburg Bendway and Middle Reach. A second concentrated release could occur during the first flows of the winter flood season when fine sediment on gravel bars and in the extracted pools is mobilized. However, background suspended sediment and turbidity levels are high; therefore, the additional contribution would be only a fraction. High flows would occur later in the winter season and would flush away the fine sediment. Therefore, this is considered a ***short-term, significant impact.***

Mitigation Measures

Implementation of Mitigation Measure 4.4-1 would reduce the above impact to a *less-than-significant level.*

4.4-1 *The project proponent shall construct a temporary secondary de-silting pond downstream of the extraction area before flow enters the live channel. This measure would be required of Alternative 2.*

The extraction area in the live stream should drain into a secondary pond constructed by a perimeter gravel berm. This berm would be constructed such that it would not be breached until the magnitude of the flood is sufficient to flush the fine sediments from it.

Project Impact

4.4-2 Bar skimming removes bar armor or pavement, exposing finer sediments. These finer sediments are more subject to mobilization during smaller floods than the pre-project bed. Therefore, more fine sediment could be released at a lower flow, and the remaining bar sediments may be more easily mobilized during larger floods.

A-1 and A-5

No bar skimming is proposed for these alternatives; therefore, the impact is considered ***less than significant.***

A-2 through A-4

Alternatives 2 through 4 would involve recurrent bar skimming over existing areas. Fine sediment discharge in the Russian River is high in relatively small floods. Watershed sources have increased substantially since large areas were converted to agriculture. Thus the fine sediments exposed by bar skimming are not mobilized until large floods. Prior to that, fine sediments are deposited on these bars. This is considered a ***less-than-significant impact.***

<u>Mitigation Measures</u>

4.4-2 *None required.*

ENDNOTES

1. Ritter, J. and W. Brown, 1971. *Turbidity and Suspended Sediment Transport in the Russian River Basin, California*. U.S. Geological Survey, Water Resources Division Open File Report. U.S.G.S. Menlo Park, CA.

2. California Department of Water Resources, 1968, Russian River Water Quality Investigation Bull. 143-A, 282 p.

3. Ritter and Brown, 1971, Op cit.

4. State of California Department of Water Resources, 1968, op cit.

5. Ibid.

6. U.S. Geological Survey, 1971, op cit.

4.5 GROUNDWATER

4.5 GROUNDWATER

SETTING

Groundwater supplies about 60 percent of the total water demand in the areas near the middle reach of the Russian River and Dry Creek. The City of Healdsburg (Fitch Mountain and Dry Creek well fields), City of Windsor, and the Sonoma County Water Agency (Wohler wells) rely on groundwater from the Middle Reach alluvial aquifer for municipal supply (Figure 4.5-1). The Middle Reach aquifer provides water for domestic and agricultural as well as municipal uses. Besides the municipal supply wells, many wells are found on individual properties. Other areas rely on conjunctive use of surface and groundwater supplies. Increases in population in Sonoma County in the future will place greater demands on the groundwater resources in the Middle Reach area.[1]

The Middle Reach alluvial aquifer is unconfined within alluvial deposits underlying the Russian River floodplain and terraces. This aquifer underlies the Middle Reach Valley extending from the City of Healdsburg to the terraces and floodplains below the Wohler Bridge (RM 23.5). The saturated aquifer thickness measured in municipal supply wells ranges from 31 feet at the Fitch Mountain Well Field to 47 feet at the Windsor wells (Figures 4.5-2, 4.5-3 and 4.5-4). The Russian River channel lies 30 to 50 feet above the base of the aquifer. Most wells fully penetrate the aquifer to its base, the boundary of the alluvial sediments with the underlying ubiquitous "blue clay". The top of the groundwater table coincides in elevation with the low flow channel. Pump test results by Todd Engineering, Inc.[2] and characteristics of the aquifer indicate that all municipal wells in the Middle Reach are hydraulically connected to surface water in the river and Dry Creek.

The City of Healdsburg's Fitch Mountain Well Field serves the southern part of the City of Healdsburg. The present maximum daily demand in the southern service area is 2.22 million gallons per day (mgd) and is projected to be 2.64 mgd at full build out after 2005.[3] The present production capacity is estimated to be between 2.81 to 3.35 mgd from Fitch Mountain Wells 1 and 2,[4] with an undeveloped extra 0.72 mgd from Well 4. Well 3 is abandoned and does not function. Pump tests on Well 4 indicate a specific capacity of 41 gpm per foot of drawdown. Wells 1 and 2 have specific capacities of 87 and 52 gpm/ft, respectively. The higher production rates are a function of the distance to the Russian River, which is a recharge boundary. Well 4 is located at twice the distance from the river of Wells 1 and 2.

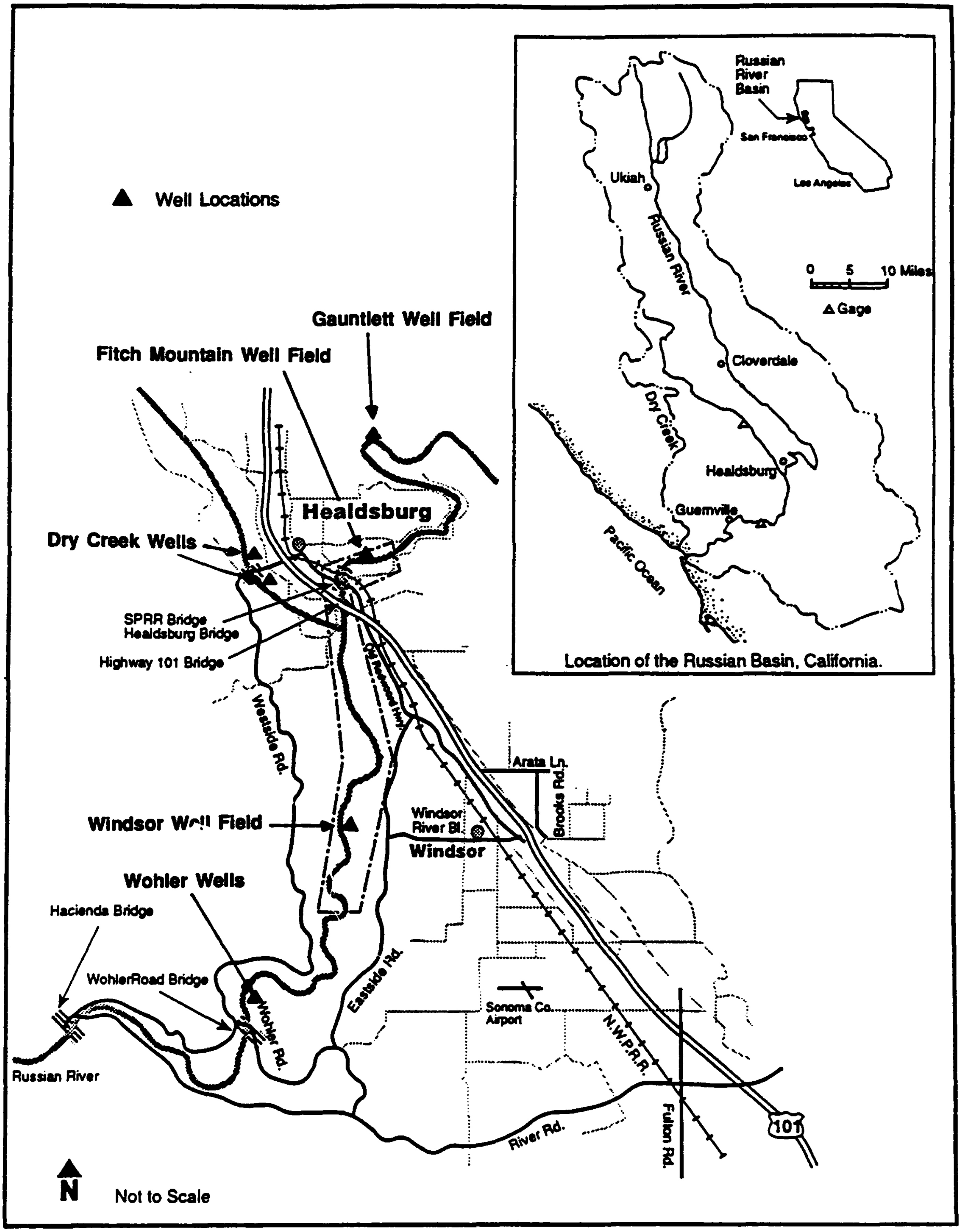


Figure 4.5-1
Map of the Middle Reach of the Russian River showing locations of municipal wells. (Adapted from EIP Associates, 1992.)

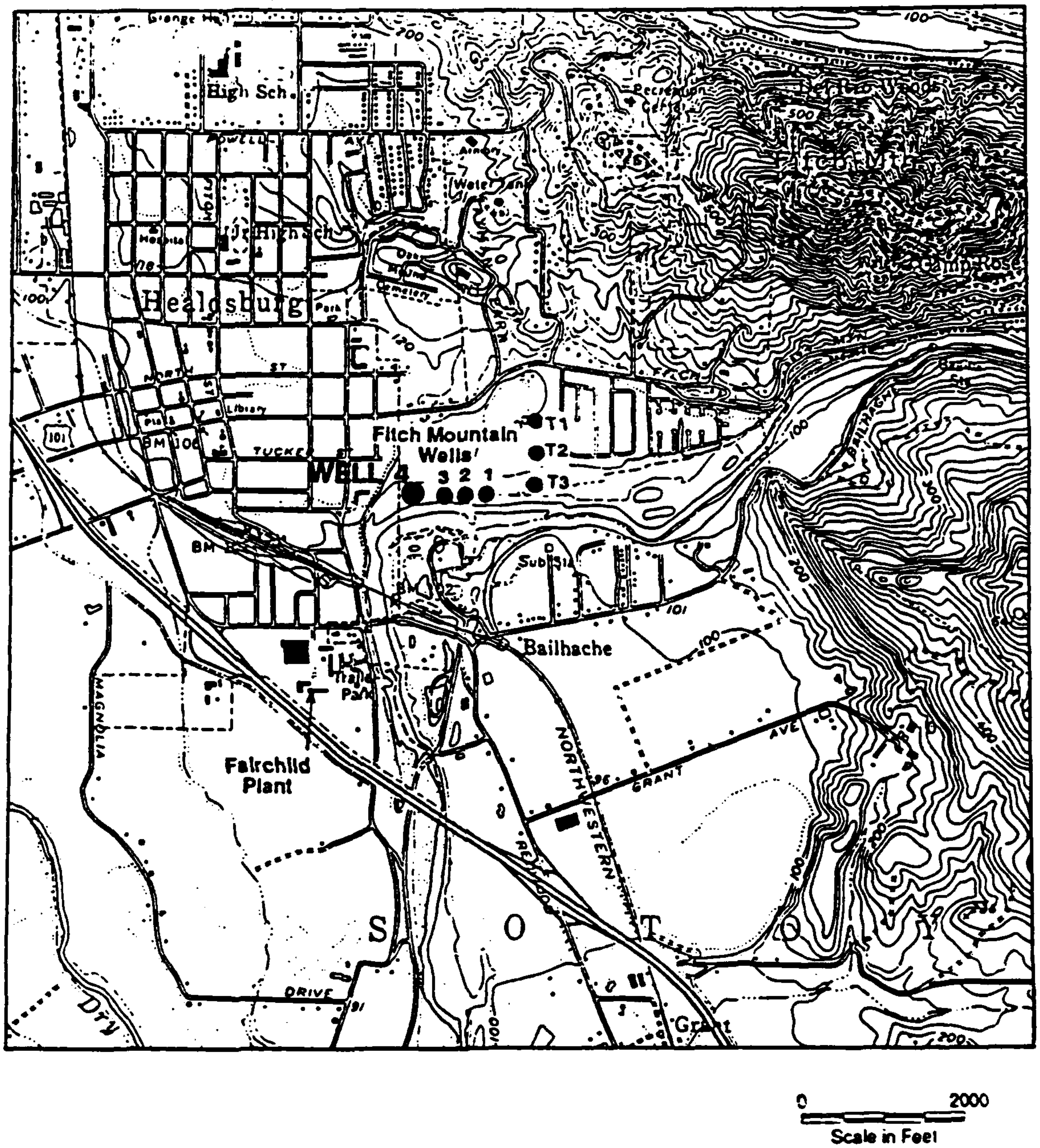
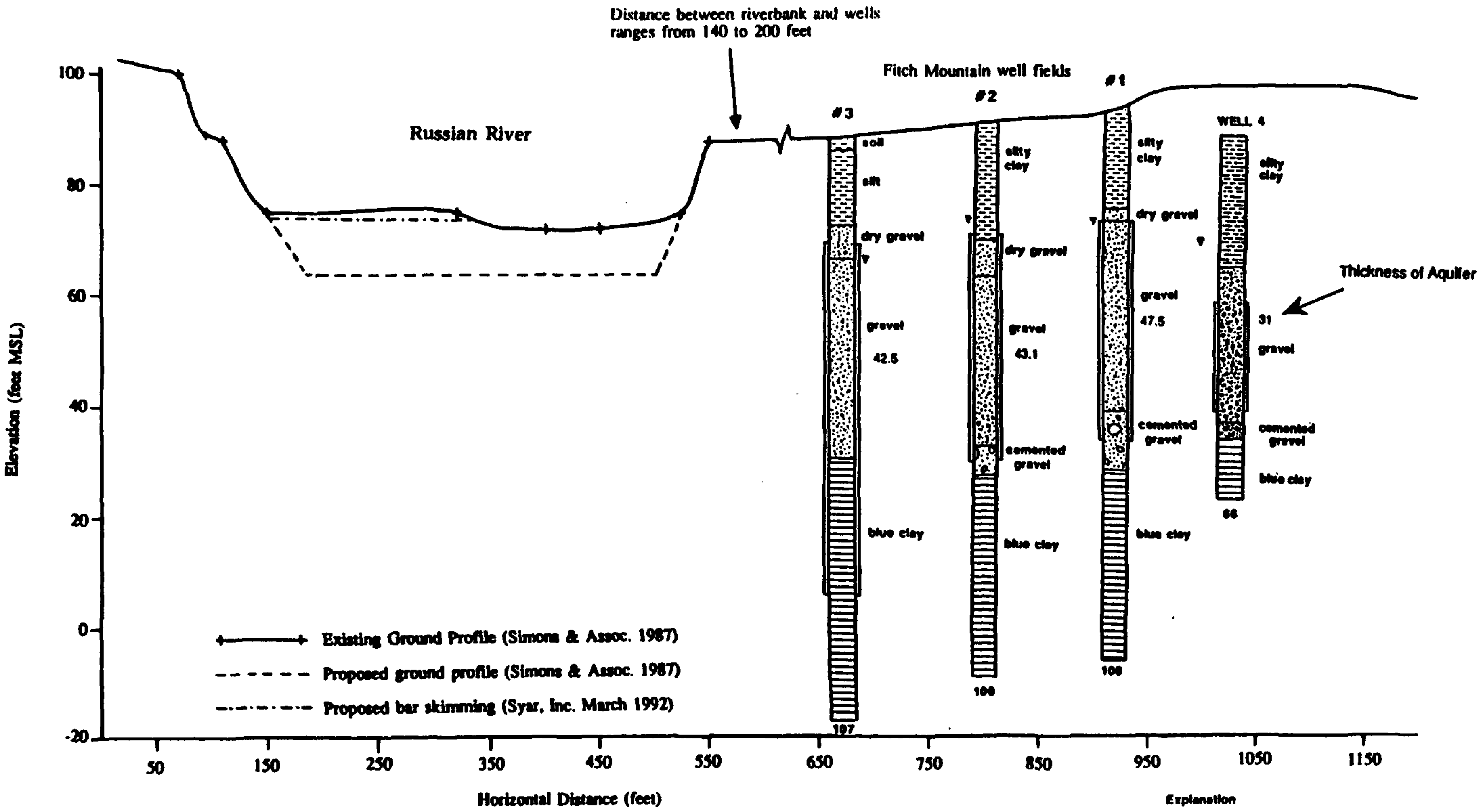


Figure 4.5-2
Map showing the location of the Fitch Mountain Well Field. (Source D. K. Todd Engineers, Inc. 1992a.)



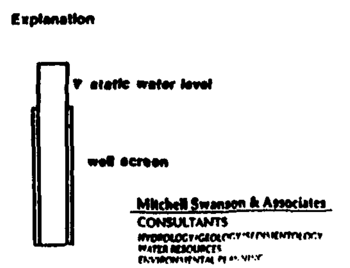


Figure 4.5-3

Representative cross section (looking downstream) through bar 5A, showing proposed instream gravel mining areas and their relationship to the City of Healdsburg's Fitch Mountain well field. (Well log data from D. K. Todd engineers, Inc., 1991.)

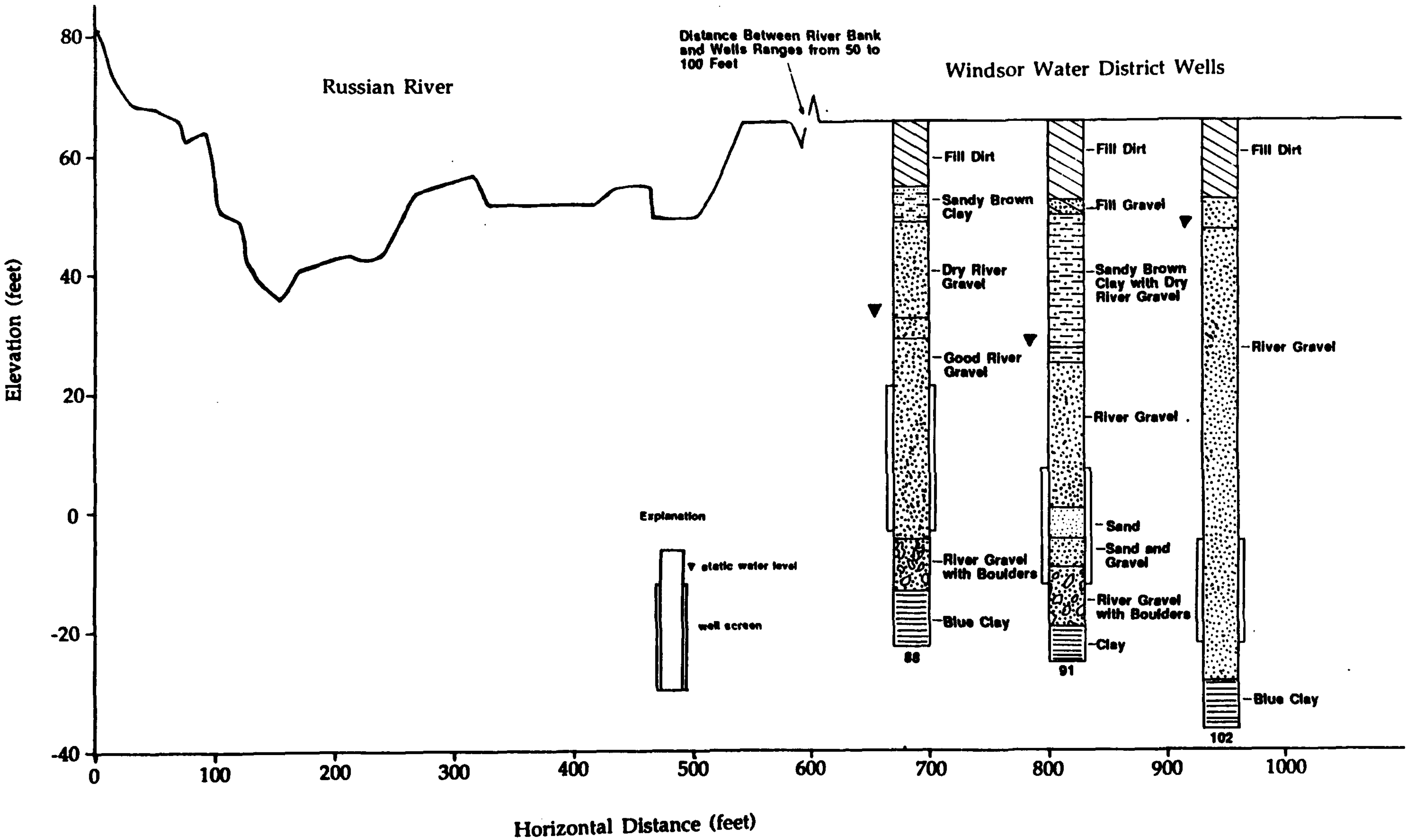


Figure 4.5-4

Representative cross section (looking upstream) through the Russian River channel and the Windsor Water District wells showing the relationship between the river channel, the alluvial aquifer and the well field. Actual well locations range from 50 to 100 feet from the east bank and run parallel to the river. (Cross section data from Hogan, Schoch and Associates, 1991. Well data from Winsor Water District, 1992.)

Mitchell Swanson & Associates
CONSULTANTS

The City of Healdsburg's Dry Creek Well Field, located along the east bank of Dry Creek below the West Side Bridge, is not presently in production, having been shut down as a municipal supply well in 1959 due to sulphurous odor. Recent tests have shown that it is feasible to re-develop the well field as an additional supply to the southern service area. Similar to the hydraulic relationship of wells near the Russian River to the low flow channel, the water table is graded to the low flow channel elevation of Dry Creek. The aquifer extends approximately 35 feet below the channel thalweg and the wells are fully penetrated. Tests performed on Well 1 found that a pump rate of 800 gallons per minute caused approximately 12 feet of drawdown, resulting in a specific capacity of about 60 gpm per foot of drawdown.

The City of Healdsburg's Gauntlett Well Field, located in upper Digger Bend, is not hydraulically connected to the Russian River in the project reach because bedrock separates the aquifer in Digger Bend from the Middle Reach aquifer. The Gauntlett Well Field serves the northern area of the City of Healdsburg.

Cardwell[5] and DWR[6] define four alluvial water bearing zones hydraulically connected with the Russian River: Holocene River Channel Deposits of very permeable sand and gravel; Alluvium consisting of moderate to highly permeable deposits of gravel, sand and clay lenses located along the fringes of the valley sides; and moderately permeable Terrace Deposits and Older River Deposits of gravel, sand and clay.

Groundwater movement in the valley is generally in a north to south direction longitudinal to the valley axis (Figure 4.5-5). The Dry Creek Valley alluvial aquifer enters just north of the Grace Ranch Pit and merges with the Middle Reach aquifer along the west side of the Russian River. The aquifer on the east side of the valley is bounded by older alluvial deposits and has several large gravel extraction pits dug below the groundwater table to the base of the aquifer. The pits are either active extraction pits, abandoned, or being used to dispose of waste silts.

The groundwater table in the Middle Reach is graded to the water surface elevation in the Russian River. In most areas, flows in the river are augmented groundwater inflow (i.e. gaining stream). However, PWA found through an analysis of streamflow records and calculation of water mass balances that the flow reverses in dry periods of some years, thereby river flow recharges the aquifer (i.e., losing stream).[7] Figure 4.5-6 shows surface flow losses in the Russian River between the upstream and downstream ends, accounting for flow gains at Dry Creek and losses due to pumping wells near the River. This suggests that the valley groundwater table is sensitive to the elevation of surface water in the river, and therefore to the elevation of the channel bed. This concurs with the conclusions of DWR (1983), who cautioned that drops in river flows (either rate or water elevation) could affect groundwater levels in the valley, and especially shallow wells near the river. It should be noted that the mass balance calculation of PWA (1992) considered the entire valley between the USGS stream gages at Healdsburg and Guerneville; therefore, localized reaches of the river could be either gaining flow from the aquifer, or losing flow to it.

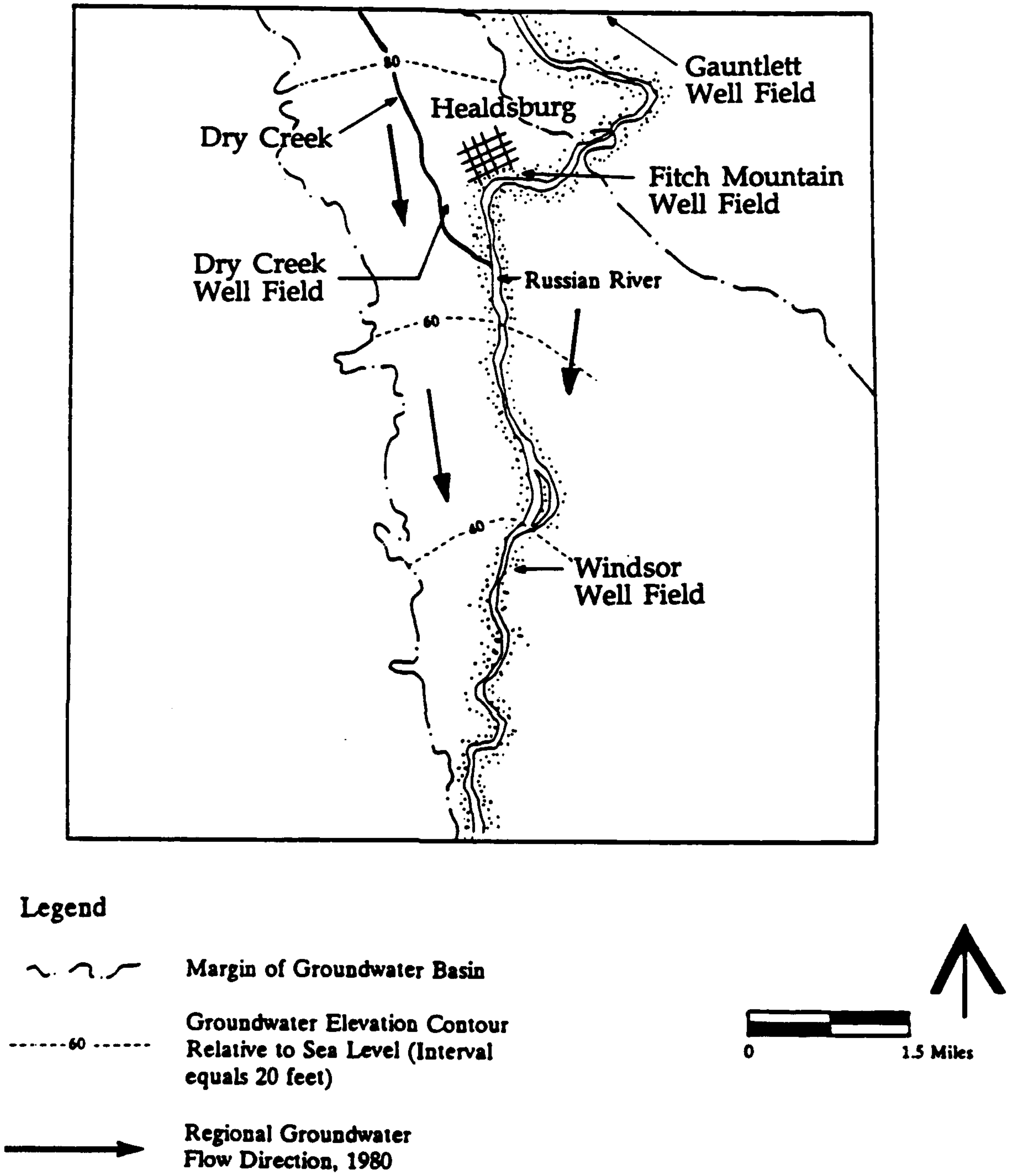
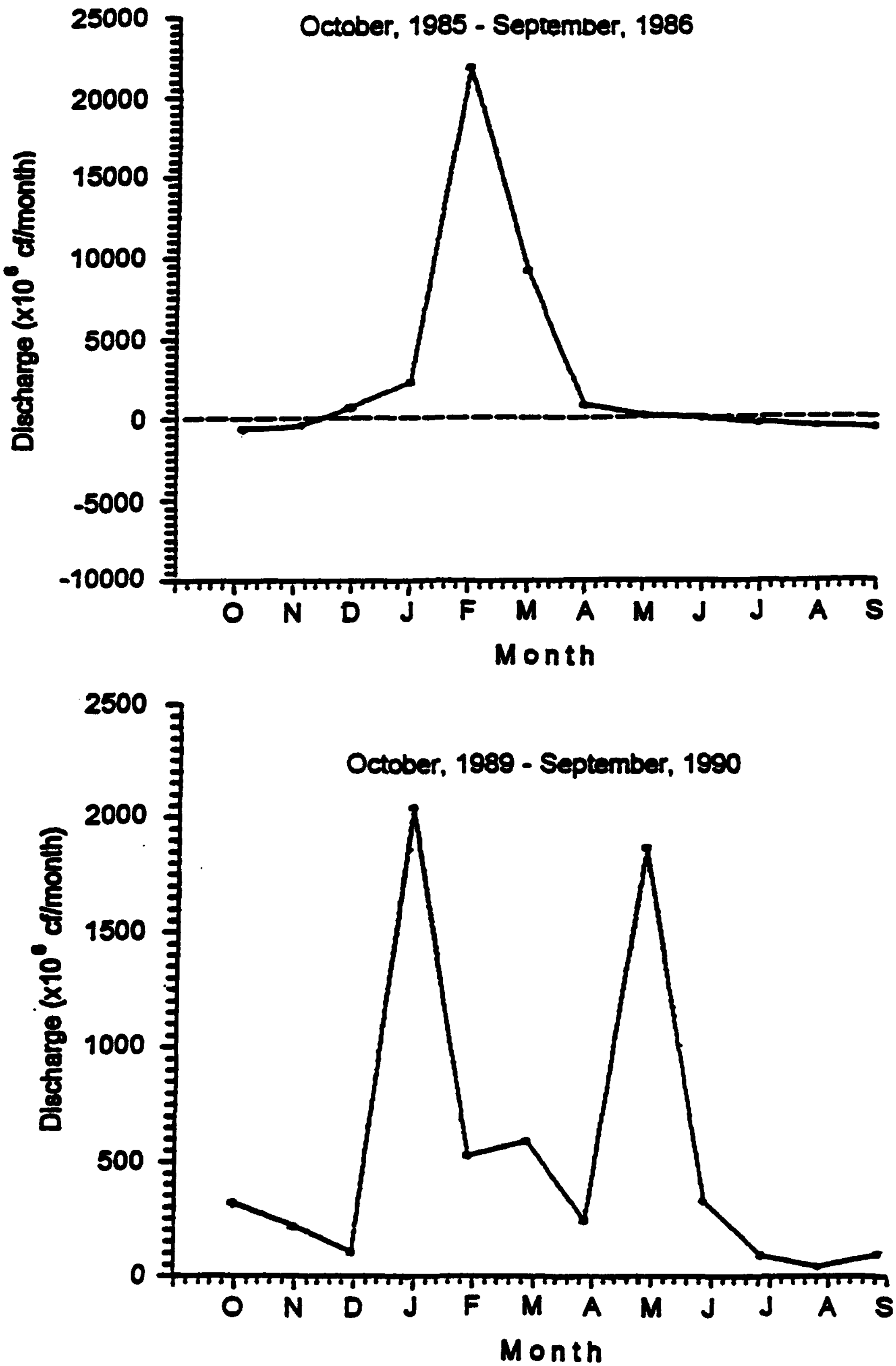


Figure 4.5-5
Groundwater elevations and direction of flow in the Middle Reach aquifer in the Russian River Basin. (From Baseline 1992.)



SOURCE: Mitchell Swanson & Associates, 1993.

Figure 4.5-6

Flow Losses on the Russian River Between the Healdsburg and Guerneville Gages Attributable to Aquifer Recharge for Water Years 1986 and 1990 (From PWA, 1992)

PWA (1992) analyzed and surveyed historic well records and found that wells in the Middle Reach show a lowering trend of 2 to 10 feet since the early 1950s. Wells close to Dry Creek showed recovery since 1984, due to the increase in summer flow releases occurring since closure and operation of Warm Springs Dam. PWA could not attribute the drop in the groundwater table to drought or overdraft. Alternatively, degradation in the bed of the Russian River between the 1950s and 1970s, and the associated drop in the water surface elevation of the Russian River, is viewed as the primary cause.

The City of Healdsburg's Fitch Mountain Wells are clearly pumping from the underflow of the Russian River above the Healdsburg Dam. Pump tests show drawdown stabilized in only 5 minutes, indicating a hydraulic connection to a recharge boundary at the Russian River, no more than 240 feet away. The Healdsburg Dam elevates water levels near the well field in the summer season when its flashboards are up. Since its construction in 1952, the dam has limited channel bed degradation at the Fitch Mountain Well Field; this prevented the concurrent drops in groundwater elevations that occurred with degradation downstream of the dam.

Brelje & Race found that future water supplies could be secured by development of one additional well at the Fitch Mountain Field and at the Dry Creek Field to serve the southern service area.[8]

The Windsor Water District wells (RM 28.5) are situated to draw underflow from the Russian River. Present production is around 3 mgd from three wells. Future growth in the City of Windsor will increase the demand to 7.0 mgd. Pump tests indicate that the specific capacity of these wells is 70.55 gpm per foot.

The SCWA has operated horizontal Ranney collector wells just upstream of the Wohler Bridge since the 1950s. These wells draw water through the channel bed gravels. Channel bed degradation occurred in the 1950s and 1960s, but stabilized in the early 1970s. A seasonal rubber dam was constructed downstream of the Wohler bridge to increase the water stage or hydraulic lead over the well field and increase their efficiency.

Groundwater Quality

The quality of groundwater is an important factor in its suitability for different uses. DWR (1983) measured chemical water quality parameters and found that groundwater in the area is moderately hard to hard (dissolved $CaCO_3$), but generally suitable for all uses. Their sampling also showed that surface water was moderately hard and met water quality criteria for all general uses.

Todd Engineers describe the occurrence of turbidity problems in the City of Healdsburg's Fitch Mountain and Dry Creek well fields.[9] Turbidity consists of fine mineral and organic particles that may be dislodged from the aquifer material near the well screen or slots, or from a source of turbid surface water that enters the pumped well. Turbidity can cause problems in water clarity and taste, and some of the suspended mineral constituents can adsorb iron and/or manganese. The State of California Department of Health Services (DOHS) requires that well water "under

the influence of surface water" must meet surface water treatment standards, since there may not be adequate filtration of giardia-sized particles. The City of Healdsburg is conducting studies and tests to determine the baseline water quality of their well systems, and to determine any treatment needs. Todd Engineers (1992a) found high turbidity concentrations in Well 4 in the Fitch Mountain Field (4.5 NTU) and referred to past turbidity problems in other wells. It was later concluded that the concentration could be reduced to a lower level (0.5 NTU) with a moderation in the well pump rate, and further development of the well (pumping and backflushing). High pumping rates, turbulent flow into the well and high velocities near the well screen or slots can dislodge fine aquifer sediments and draw them into the well.

Brelje & Race state that the quality of water (specifically turbidity) taken from the municipal well fields is the greatest concern and challenge for the City of Healdsburg to maintain present and develop future water supplies. Filtration treatment would require that the City build facilities and conveyance systems at a substantial additional expense. Monitoring studies are underway to determine the baseline quality of groundwater in order to comply with the DOHS regulation by June 1993.

A Title 22 chemical analysis was conducted for Well 4 in the Fitch Mountain Well Field in June 1991. The test found that concentrations were less than the detection limits for nine Title 22 pesticides. Priority pollution metals were below "MCL reporting limits" except for aluminum, barium, iron, manganese and zinc. Samples taken at Well 2, located 405 feet upstream and 90 feet closer to the Russian River than Well 4, indicated "...no priority pollutant metals or pesticides."[10]

The Windsor wells have recently experienced problems with air entrainment in their wells. This has necessitated a reduction in pump rates in Well #7 and loss of production. The Windsor Water District (WWD) is presently undertaking an analysis of the problem; however, it is likely related to changes in the aquifer near the well screens. WWD may drill an additional well in order to moderate pumping rates. Turbidity measured at the well is reported to be a constant 0.15 NTU, well within the "acceptable" range.[11]

DOHS has ascertained that the Windsor wells are strictly groundwater not under the influence of surface water. This relieves WWD of the surface water source filtration requirement.

IMPACTS AND MITIGATION MEASURES

Method of Analysis

An understanding of the alluvial aquifer of the Russian River was gained through the review of reports by DWR,[12] Simons & Associates,[13] PWA and Rubin,[14] USGS,[15] D. K. Todd and Associates,[16] the City of Healdsburg,[17] and Curry[18]. The scope of the impact analysis included effects of the project on groundwater supply wells, storage, quality and recharge.

Standards of Significance

An impact to groundwater is considered significant if the effect of a proposed action could lead to meaningful loss of groundwater supply, municipal or domestic groundwater supply or quality or groundwater availability to plants. The important factors are changes in the depth to groundwater from the land surface, reductions in saturated thickness greater than well drawdown and/or overall specific capacity, and measurable changes in the degree of filtration. A significant impact would also occur if an alternative would measurably increase the effort or cost associated with the maintenance and development of supply.

Project Impact

4.5-1 Below the Healdsburg Dam, bed degradation would lower the groundwater levels in the alluvial aquifer hydraulically connected to the Russian River, which could increase pumping costs at the Windsor and Dry Creek Municipal supply wells.

A-1 The No Project Alternative would not affect existing groundwater supplies or production. This is considered a ***less-than-significant impact.***

A-2 and A-3

The Proposed Project and Gravel Bar Skimming alternatives could cause or accelerate bed degradation by 5 to 7 feet along the reach below the Healdsburg Dam, resulting in a decrease in the grade elevation of the groundwater table at the river. This could lower the groundwater table by as much as 5 to 7 feet at the Windsor wells, which could increase pumping costs.

Similarly, the Dry Creek Well Field could experience lowering of the water table, but to a lesser degree, perhaps 1 to 3 feet. This would increase pumping costs during low flow periods. This is considered a ***significant impact.***

A-4 This alternative should not have an impact on the groundwater table, since instream mining would be limited to annual replenishment, so it is considered ***less than significant.***

A-5 The Streamway Alternative would not have a significant effect on groundwater resulting from channel bed degradation, since it does not include instream mining which could induce channel bed degradation. Therefore, the impact is ***less than significant.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.5-1 *Pumping costs incurred as a result of Alternative 2 or 3 shall be reimbursed by the project proponent.*

Using baseline production and pump lift costs established prior to implementation of the project, pumping costs incurred as a result of Alternative 2 or 3 shall be determined. These shall be monitored with the project implementation and the changes, if any, shall be documented. Lift costs attributable to the project shall be levied to the project proponent.

<u>Project Impact</u>

4.5-2 Channel degradation could cause groundwater levels to drop in the Russian River below Healdsburg Dam and in Dry Creek. Lower water table levels would result in decreased groundwater aquifer storage capacity and possible decreases in production at the Windsor and Dry Creek Municipal Well Fields.

A-1 through A-5

If the saturated aquifer thickness is decreased due to channel bed degradation, then groundwater storage available for extraction would decline. Well data at the Windsor Wells indicates that static water levels would be reduced from 49 feet to 42 feet in Well #6 and 61.5 feet to 54.5 feet in Well #8. A review of groundwater well pump tests at the Windsor wells indicates that rates of production could be achieved by the same drawdown (21 to 33.4 feet at 1800 - 1850 gpm) within the reduced aquifer (42 to 64.5 feet thick) if it were lowered by 5 to 7 feet. The aquifer materials appear to be fairly homogenous sands and gravels; therefore, their hydraulic conductivity should not vary greatly with depth.

Similarly, Well 1 in the Dry Creek Well Field would be able to produce 800 gpm with 13 feet of drawdown from an aquifer reduced in thickness from 35 to 32 feet, after 3 feet maximum of degradation in the Dry Creek channel.

Since well production quantity would not be decreased by this change, unless a lowered water table interacts with other factors in an unanticipated manner creating unforeseen problems with production (pumping rates, water quality, or other non-projected related production factors), this is a ***less-than-significant impact***.

<u>Mitigation Measure</u>

4.5-2 *None required.*

<u>Project Impact</u>

4.5-3 Below Healdsburg Dam, private wells that are shallow or are located in areas where the aquifer is thin (10 to 30 feet saturated aquifer thickness) could lose groundwater production due to a decline in the water table caused by channel degradation.

A-1, A-4 and A-5

Accelerated streambed degradation is not anticipated with these alternatives. This impact is considered ***less than significant.***

A-2 and A-3

Private wells used for agriculture or domestic uses are numerous in the Middle Reach area. Little public information is available to define the hydraulic characteristics of these wells. A survey conducted Sonoma County and PWA[19] found that wells with depths between 30 to 40 feet lost production or dried up completely during the period of intensive channel degradation below Healdsburg Dam (1940 to 1972). If the water table were to decline 5 to 7 feet at shallow private wells under Alternatives 2 or 3, amounting to 30 to 70 percent of the saturated aquifer thickness, then water production could be significantly reduced or eliminated.

Where affected wells are already fully penetrating the aquifer where the alluvium is thin (e.g., near the edge of the valley), this impact would be ***significant and unavoidable.***

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact, *but not to a less-than-significant level.*

4.5-3 *Where affected wells have not fully penetrated the aquifer, the project proponent shall reimburse the total cost of increasing the depth of any wells shown to be significantly affected by reductions in the water table directly caused by project-related reductions in the streambed elevation. Sonoma County shall retain an independent and objective goundwater expert to review groundwater and river monitoring data, determine the causes of any significant changes and the responsibilities of the project, and recommend appropriate measures to rectify the impacts. This measure would be required for Alternatives 2 and 3.*

Project Impact

4.5-4 Pumping lift costs at the Fitch Mountain Well Field could increase during low flow periods when the Healdsburg Dam flashboards are down if the groundwater table is lowered by channel excavation or resultant degradation.

A-1, A-4 and A-5

These alternatives would not involve operations above Healdsburg Dam. Therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

During low flow periods, water table elevations in the alluvial aquifer in the vicinity of the Fitch Mountain Well Field are controlled by the Healdsburg Dam when the flashboards are up in the summer season, or by the riffle (estimated elevation = 74.0 feet) in the Healdsburg Bendway which acts as hydraulic control. Removal of the riffle at the Healdsburg Bendway by channel excavation (Alternative 2) could lower the groundwater table at the Fitch Mountain Field by up to 3.0 feet in non-summer, low flow conditions. The Healdsburg Dam with flashboards down would maintain low flow water levels above 70.5 feet. This impact would occur mainly during Fall periods between lowering of the Healdsburg Dam flashboards (the day after Labor Day) and winter floods and high winter base flows (approximately November 15). Pumping lift costs could increase in this period which is considered a ***significant impact***.

The Gauntlett Well Field located in Digger Bend at river mile 40 would not be affected by any of the alternatives since it is well upstream bedrock control on the channel bed at river mile 35. Any degradation induced by extraction exceeding replenishment rate in the Riverbend or Healdsburg Bendway would cease at the bedrock control at River Mile 35.

Mitigation Measure

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.5-4 *A monitoring program shall be established to accurately identify project-caused reductions (if any) in groundwater elevations at the Fitch Mountain Well Field. Should such reductions result in an increase in pumping or operational costs for the field, the increase shall be funded by the project proponent.*

Project Impact

4.5-5 Channel excavation and subsequent channel degradation above the Healdsburg Dam could reduce or eliminate groundwater production at private wells upstream of or near the Healdsburg Bendway site.

A-1, A-4 and A-5

No operations would occur above the Healdsburg Dam under these alternatives. Therefore, this impact is considered ***less than significant***.

A-2 and A-3

Channel and bar excavation at the Healdsburg Bendway and Riverbend, and resultant degradation, could reduce the groundwater table and thereby reduce or eliminate

production at shallow private wells. Extraction rates would exceed average supply under Alternatives 2 and 3. Alternative 2 calls for annual extraction rates of up to 200,000 tons per year from the Healdsburg Bendway and Riverbend sites. This exceeds the best estimate for gravel replenishment for the reach of 130,000 tons per year,[20] and does not account for year-to-year variability, which could cause a sediment supply deficit above the Healdsburg Dam. This deficit may be further exacerbated by the loss of gravel taken in the Alexander Valley Reach and in Mendocino County.

Although little information on private wells is available, it is possible that some are close to the river and are sensitive to declines in the water table. The effect on private wells would vary with season and with location relative to the Healdsburg Dam. In the summer months with the Healdsburg Dam flashboards up, water behind the dam becomes a 2-mile long pond at an approximate elevation of 80.5 feet MSL. Wells producing in the summer months along this pond up to the bedrock control at River Mile 35 would not be affected, because the project would not change this condition. With the flashboards down and under low flow conditions, primarily in the Fall before winter flows, shallow private wells could experience a declining water table resulting in loss or elimination of production. This is a ***significant and unavoidable impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact, *but not to a less-than-significant level.*

4.5-5 *If the affected well does not fully penetrate the aquifer, it shall be re-drilled and deepened at the expense of the project proponent. A monitoring plan shall be established to identify changes in the river channel before and after the project to relate any degradation caused by the project to declining water table and loss of production.*

The impact is significant and unavoidable where the wells are fully penetrating and re-drilling would not improve production.

Project Impact

4.5-6 Channel excavation at the Healdsburg Bendway and any resultant degradation would reduce the aquifer filtration of water drawn from the riverbed to the well.

A-1, A-4 and A-5

No mining would occur at the Healdsburg Bendway under these alternatives, so this is considered a ***less-than-significant impact.***

A-2 and A-3

Groundwater pulled from the Russian River into pumping wells at the Fitch Mountain Well Field is filtered as it passes through the sands and gravel of the alluvial aquifer. The degree of filtration is dependent upon the nature of the aquifer materials, and the length of flow path between the river bed and the screen of the well. The present distance between Wells 1, 2 and 4 at the Fitch Mountain Well Field and the Russian River ranges between 100 and 250 feet. The operations at the Healdsburg Bendway could lower the channel bed by 3 feet, thereby slightly reducing the flow path length through the aquifer. Since this represents less than 3 percent of the distance in the worst case, this impact is considered ***less than significant.***

Mitigation Measures

4.5-6 None required.

Project Impact

4.5-7 Excavation of the channel bed and bar at the Healdsburg Bendway would deepen the channel in the river near the Fitch Mountain Well Field. This could accelerate the deposition of fine sediments which could reduce the permeability of the river bed substrate and reduce production and recharge.

A-1, A-4 and A-5

Because operations would not occur at the Healdsburg Bendway, this is considered a ***less-than-significant impact.***

A-2 Under Alternative 2, channel excavation to depths up to 16 feet at the Healdsburg Bendway would deepen the pool in the vicinity of the Fitch Mountain Well Field. The excavation would leave a channel thalweg slope of 0.0006 through the Bendway, a slope sufficient to maintain mean flow velocities of 5 to 6 feet per second and depths up to 15 feet during a two year flood flow of 25,000 cfs. This and lesser flows would be sufficient to flush fine sediments through the channel reach. Field observations made at the Russian River channel bed directly opposite Fitch Mountain Well #1 found that the channel bed was covered with silty sand over an extensive area. This suggests that the river bed is periodically covered with fine sediments under existing conditions during summer conditions, and this would not change substantially with the project. In addition, the channel excavation would lower gravel bars below the water surface during low and moderate flows, thereby increasing the potential recharge area to the well. The turbidity problems at the Fitch Mountain Well Field appear to be related more to well development factors and not an adequate filtration of sediment-laden front waters in the Russian River.[21] For these reasons, this impact is considered ***less than significant.***

A-3 Alternative 3 would involve only bar skimming, so hydraulic conditions would remain the same, as they are at present. Therefore, this is considered a ***less-than-significant impact.***

Mitigation Measures

4.5-7 None required.

Project Impact

4.5-8 Excavation and reclamation of the Doyle Pit could result in effects on local groundwater supplies and movement.

A-1 and A-5

Under the No Project and Streamway alternatives, no further excavation of the site would occur; therefore, this is considered a ***less-than-significant impact.***

A-2 through A-4

Replacement of coarse alluvial aquifer sand and gravel with fine sand, mud and silts by deposition from overbank flooding reduces the specific yield of the aquifer (the volume of water that can be pumped from the fine sediments aquifer). Aquifer permeability between the river and the aquifer may be reduced as well. This can reduce well production and reduce recharge from the river to wells and the aquifer immediately around the Doyle Pit. This is considered a ***significant impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.5-8 *The project proponent shall retain the lower 10 feet of aquifer in the base of the pit and backfill with graded material, such as gravels and finer sands, to seal the top from fine sediment infiltration. In addition, a 400-foot strip of aquifer shall be retained along the length of the ends of the pit. This measure is required for Alternatives 2 through 4.*

Leaving the lower 10 feet of aquifer in the base of the pit retains local aquifer hydraulic continuity. Graded backfill material would help prevent clogging of gravel by fine sediment infiltration. Some significant impacts could remain if nearby wells are screened to elevations in the aquifer coincident with the open pit and above the lower 10 feet. If this occurs, the depth of those wells may need to be increased to a depth coinciding with the lower ten feet of the Doyle pit. This would be done at the expense of the project proponent.

Cumulative Impact

4.5-9 Pit excavation at the Doyle site would contribute to a reduction in transit time for groundwater flow down the valley, and the time it takes to flush the aquifer if a contaminant were introduced.

A-1 and A-5

Under Alternatives 1 and 5, mining would not occur at the Doyle site; therefore, this would be a ***less-than-significant impact.***

A-2 through A-4

Although it appears that other pits would create the majority of this impact, excavation of the Doyle site would contribute to reductions in the transit time of groundwater flow. This impact is considered ***significant and unavoidable.***

Mitigation Measure

The following mitigation measures would reduce the impact, *but not to a less-than-significant level.*

4.5-9 *Implement Mitigation Measure 4.5-8. This measure is required for Alternatives 2 through 4.*

Beneficial Impact

Floodplain ("terrace") skimming in Alternative 5 to form a streamway would re-establish the pre-1950s groundwater regime in local reach by reducing the distance between the ground surface and the groundwater table (Figure 7.13 in Appendix C). This would create more area for riparian growth and reclamation to agricultural uses, and reduce groundwater pumping lifts for wells.

ENDNOTES

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2. Todd Engineers, Memoranda regarding City of Healdsburg Wells and Water Supply, 1992a, 1992b and 1992c.

3. Brelje & Race, Consulting Civil Engineers, *City of Healdsburg, Sonoma County, CA, Operations Evaluation*, Department of Public Works, 1992.

4. Ibid.

5. Cardwell, G.T., 1965. *Geology and Groundwater in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys, Sonoma and Mendocino Counties, California.* U.S. Geological Survey Water Supply Paper 1548.

6. State of California Department of Water Resources, 1983, *Evaluation of Ground Water Resources Sonoma County.* Volume 5: Alexander Valley and Healdsburg Area, Bulletin 118.

7. Philip Williams and Associates, 1992. *Hydrologic Aspects; Aggregate Resource Management Plan Update and EIR.* Report to Sonoma County Department of Planning and EIP Associates, San Francisco.

8. Brelje & Race, Op cit.

9. Todd Engineers, 1992a, 1992b, Op cit.

10. Todd Engineers, 1992a, Op cit.

11. John Johnson, Windsor Water District, personal communication, September 1, 1992.

12. State of California Department of Water Resources, 1983.

13. Simons & Associates, Memoranda on ground water monitoring for Syar Industries, 1991 and 1992.

14. Philip Williams and Associates, Op cit.; Rubin, 1992.

15. Cardwell, G.T., Op cit.

16. D.K. Todd, Iris Priestaf, D.K. Todd and Associates, personal communication, September 1, 1992.

17. Bob Robertson, City of Healdsburg, personal communication, September 1, 1992.

18. Dr. Robert Curry, Memoranda regarding the Grace Pit and Russian River gravel mining impacts, 1991 and 1992.

19. Philip Williams and Associates, Op cit.

20. Philip Williams and Associates, Op cit.

21. Todd Engineers, Op cit.

4.6 FISH RESOURCES

4.6 FISH RESOURCES

INTRODUCTION

The following section describes fish resources and aquatic habitat that may be affected by the proposed project alternatives. Information and analyses presented in this section are based on a report prepared for this EIR/EIS by Entrix Incorporated entitled "Syar Industries Mining Reclamation Plan Fisheries Draft Technical Report". This report is included in this EIR/EIS as Technical Appendix D. Some portions of Section 4.6 are taken verbatim from the Entrix technical report, while other portions have been summarized or condensed in order to enhance the general readability of the EIR/EIS. The determination of impact significance presented in this section were made by EIP based on information provided in the Entrix Report, significance criteria established by EIP, and the requirements of CEQA and NEPA.

SETTING

Species Composition of the Russian River System

At least 46 fish species have been identified in the Russian River and its estuary.[1] These species include native and introduced anadromous, estuarine and resident fishes. Twenty-seven species are native to the system, with only the Russian River tule perch, *Hysterocarpus traskii pomo*, being endemic solely to this drainage.[2]

Anadromous fish are those species that migrate to sea but return to freshwater for spawning. The anadromous salmonids known to the system include steelhead trout (*Oncorhnchus mykiss*) and chinook, coho and pink salmon (*Oncorhynchus tshawytscha, O. kisutch,* and *O. gorbuscha*, respectively). Additional native anadromous species include the Pacific and river lampreys (*Lampetra tridentata* and *L. ayresi*), the white and green sturgeons (*Acipenser transmontanus* and *A. medirostrus*), and the threespine stickleback (*Gasterosteus oculeatus*). Introduced anadromous species include the American shad (*Alosa sapidissima*) and the striped bass (*Morone saxatilis*).

The resident species of the Russian River system include the California brook lamprey (*Lampetra pacifica*), western sucker (*Catostomus occidentalis*), three, or possibly five, species of minnows, the Russian River tule perch (*Hysterocarpus traskii lagunae*), three species of sculpins, and possibly the Sacramento perch (*Archoplites interruptus*). The Sacramento perch and two species of minnows may have been introduced into the system from the Central Valley.[3]

Introduced resident species include three species of minnows, four species of catfish, the mosquitofishes, two species of crappies, three species of sunfishes, and two species of bass (refer to Table 1 of Appendix D for a comprehensive listing of Russian River fish species).

The Russian River tule perch is the only fish species endemic solely to the Russian River. Research indicated that the Russian River tule perch is uncommon in the system, and may warrant placement on state and federal threatened and endangered species list.[4] To date this species has not been placed on either listing; although, it is listed as a species of special concern in "Fish Species of Special Concern in California"[5], and is designated as a Category 2 candidate species for federal listing as threatened or endangered.

Generally, the Russian River system is dominated by "rough" fish, specifically suckers and minnows. Historically, resident trout populations have been low in the river, and presently, trout populations occur only in headwater areas of tributary streams. Anadromous salmonids (trout and salmon that live in the ocean but return to freshwater streams to spawn) do not spawn in the Russian River (except when access to tributary streams is blocked), but use the river as a pathway to reach spawning areas in its tributaries.[6]

<u>Russian River Management Species</u>

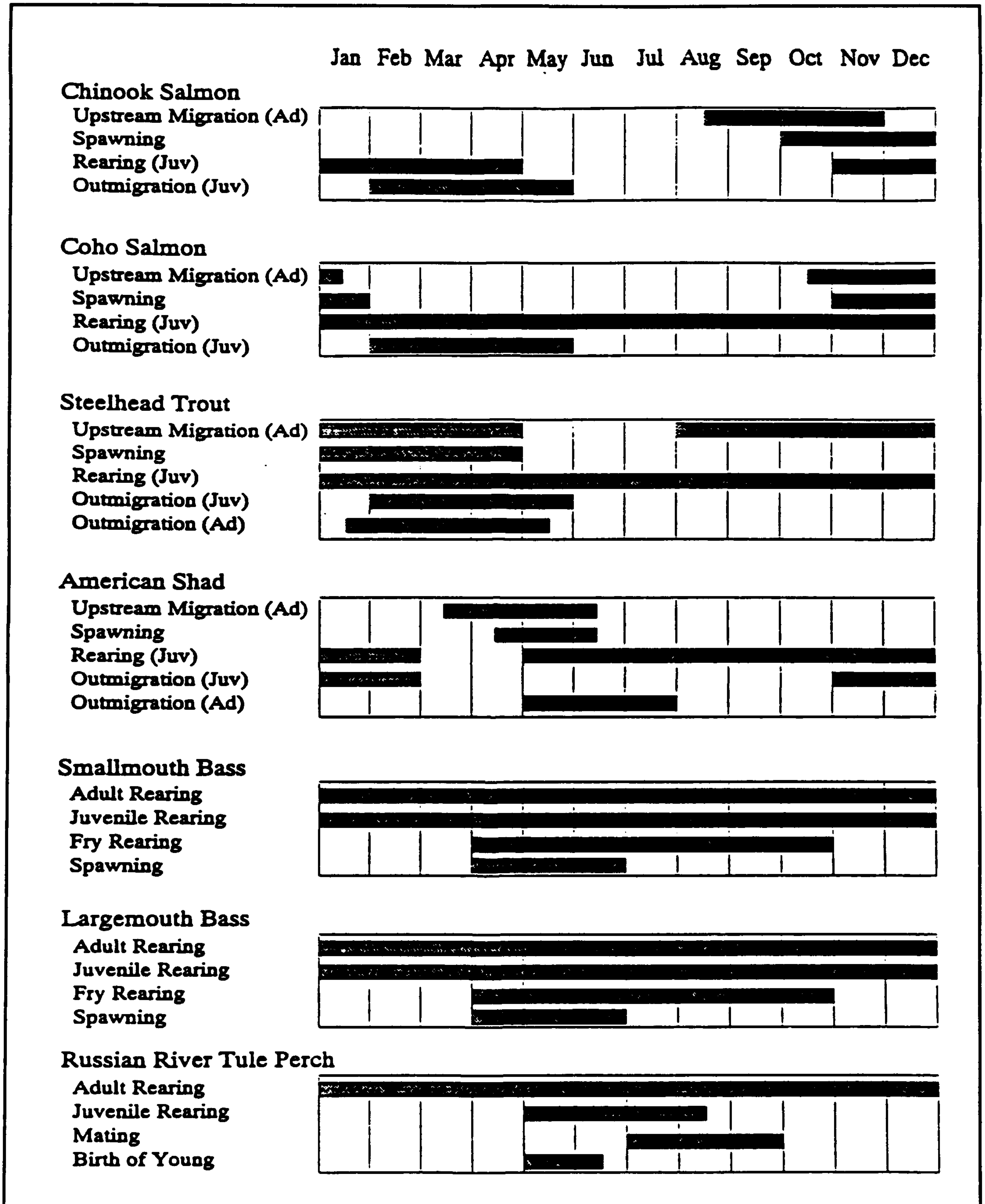
The fish species of primary management interest to the California Department of Fish and Game (DFG) and the U.S. Fish and Wildlife Service (USFWS) in the Russian River include chinook and coho salmon, steelhead trout, American shad, and resident largemouth and smallmouth bass. An additional species of importance is the Russian River tule perch, which has been identified by Hopkirk (1979) and Moyle et. al. (1989) as being of special concern because of its current status as a federal Category 2 candidate species. The California freshwater shrimp, which is included on both the state and federal endangered species lists, is known to occur in several tributaries of the Russian River, but does not occur within the study reach, and would not be effected by any of the proposed operations.

Brief descriptions of the natural histories and general habitat requirements for all fish species of management interest are presented below. More detailed descriptions are presented on pages 6 through 18 of Appendix D. Figure 4.6-1 illustrates the timing of the various life stages of the principle management species and Table 4.6-1 summarizes the general habitat requirements for those same species.

Anadromous Fishes: Chinook and Coho Salmon, Steelhead Trout, and American Shad

The life cycle of **chinook salmon** ranges from 2 to 7 years. The returning adults die after spawning. In the Russian River, a single spawning run occurs each year in the fall. Upstream migration of spawning adults occurs primarily from August through November, with spawning occurring from October through December.

Chinook salmon can migrate considerable distances up mainstem rivers and their tributaries as they travel to the stream where they were spawned using some combination of olfactory, visual,



SOURCE: ENTRIX, Inc., 1993.

Figure 4.6-1
Periodicity Information for the Principle Management Species of the Russian River System

TABLE 4.6-1

HABITAT REQUIREMENTS FOR RUSSIAN RIVER MANAGEMENT SPECIES

Fish Species	Water Velocity (m/s)	Water Depth (m)	Substrate (cm)	Cover %	Preferred Temperature (°C)
Chinook salmon					
Upstream migration	0-3.29(<2.44 max)	>0.15			5.6-19.4
Fry rearing	<0.60[f]	0.12-0.75			4.5-20.0(25.0)*
Juvenile rearing	0.60-0.30	0.15-1.22			4.5-15 (26.2)*
Spawning	0.30-1.10	>0.24	1.3-14		2.0-14.0
Coho					
Upstream migration	0-3.3(<2.44 max)	>0.18			3.3-20.6(25.6)*
Fry rearing				25%	
Juvenile rearing	0.05-0.24	0.30-1.22		25%	7.2-16.7(25.8)*
Spawning	0.30-0.91	<0.15	1.3-10.2		4.4-14
Steelhead					
Upstream migration	0-4.18(3.0 max)	>0.18			7.0-17.(23.9)*
Fry rearing	<0.21	0.12-0.60	0.2-400		6.1-20.0
Juvenile rearing	0-0.36	>0.30	0.2-400		5.0-25.6
Spawning	0.36-1.55	0.18-2.49	0.6-13		3.3-16.1
American Shad					
Upstream migration	0-1.21	0.76-10			8.3-20
Fry rearing	0.03-0.76	0.76-10			11.1-26.7
Juvenile rearing	0.09-1.21	0.76-10			7.2-19.4
Spawning	0.18-1.06	0.76-10	Sand-Boulder		10-23.9
Smallmouth bass					
Adult	<0.15	>1.0	Cobble-Boulder	15-95%	14-31
Juvenile	<0.15	>0.36	Cobble-Boulder	15-95%	11-32
Fry	<0.2	>0.67	Gravel-Boulder		12-33
Spawn	<0.45	0.48-1.64	Gravel-Boulder		12-26
Large bass					
Adult	0.013	>0.75		15-95%	20-32
Juvenile	0-0.13			15-95%	20-32
Fry	0-0.12			20-95%	20-31
Spawn	0-0.035		Silt-Gravel		16-24

* Upper lethal limit.

SOURCE: Entrix.

and compass orientation cues. Some spawners stray from their natal streams and spawn in adjacent or nearby waters. As noted previously, Chinook salmon are not thought to spawn in the Russian River, but use it as a passage corridor to reach the tributary streams where they do spawn.[7]

Females can lay between 2,000 and 14,000 eggs. Eggs are laid in the fall and hatch in the winter or early spring (January through April). The alevins remain in the gravel for 2 to 3 weeks until they absorb their yolk sacs. Once the yolk sac is absorbed, the fry emerge from the gravel and immediately start moving downstream and out of the freshwater system. Most of the downstream migrant chinook salmon move through the estuaries fairly rapidly and enter the ocean at an age of two to four months. Chinook juveniles generally rear in the Russian River from January through April. Outmigration typically occurs from February through May.

While resident in the freshwater system, juvenile chinook salmon feed on a variety of terrestrial and aquatic invertebrates. Chinook juveniles prefer shallow areas along the stream edge and move to deeper, swifter water as they grow larger.

The life cycle of **coho salmon** is from two to five years. In the Russian River, upstream migration of spawning adults occurs primarily from mid-October through mid-January with spawning occurring from November through January. Spawning coho salmon can migrate considerable distances up mainstem rivers, but seldom ascend higher than 200 km (120 miles) upstream. Coho salmon return to the stream where they were spawned using some combination of olfactory, visual, and compass orientation cues. Some spawners stray from their natal streams and spawn in adjacent or nearby waters. Coho salmon adults die after spawning.

Coho salmon are not thought to use the mainstem of the Russian River as a primary spawning area, but use it as a corridor to reach the tributary streams where they do spawn. The preferred location for spawning is at the head of a riffle in small to medium sized gravel.

After emerging, coho salmon rear in the tributary streams for one year, with outmigration generally occurring from February through May of their second spring. As the fry grown, they establish territories near the stream edge or in pools. As they become larger, they move to deeper water. The availability of cover objects is an important factor in habitat suitability for this lifestage.

Steelhead trout is the anadromous form of rainbow trout. The biological characteristics of the two subspecies are similar. Most steelhead spawn for the first time after spending two to three years in freshwater and then one to two years in salt water; however, it is not unusual for younger, smaller fish, usually males that have spent only one year in each habitat, to return to spawn.

California steelhead spawn in the spring, and frequently migrate upstream in the fall, several months before they actually spawn. Steelhead have well developed homing abilities and usually spawn in the same area in which they lived as fry. In the Russian River, the upstream migration of steelhead occurs from August through April, with spawning occurring from January through

April. Steelhead can survive after spawning, unlike chinook and coho salmon. The post-spawning survival rate of steelhead depends to a large degree on the difficulty of the upstream migration, and the water temperature. If a fish does survive after spawning, the fish will migrate back out to sea and may return to spawn again, either the next year, or the year after that.

Juvenile steelhead rear in the natal stream year round and may spend up to 3 years in freshwater. Outmigration of juveniles occurs from February through May. Juvenile steelhead migrate to sea at one to three years of age, at 13 to 25 cm total length. Adults migrate out of the river system from mid-January through mid-May. Steelhead smolts are usually larger and rear longer in freshwater (up to 4 years) than those of coho and chinook salmon.

Survival rates of steelhead embryos (as well as other salmonids) in redds (spawning beds) depend upon the amount of fine sediments present, the degree to which the redds are disturbed by freshets, changes in water temperature, maintenance of adequate flows, and other factors.

Water depth does not seem to be a critical to migrating fish, because they usually migrate when flows are high, but a minimum depth of 18 cm is required. Water velocities greater than 3 to 4 m/sec may impede their upstream progress.

American shad are members of the herring family, with thin bodies and a sawtooth keel on their stomachs. Adult shad are found in freshwater only when they move up rivers to spawn. Most young shad migrate to sea shortly after hatching. In the Russian River, upstream migration of adults occurs from mid-March through mid-June, with spawning occurring from April through mid-June.

American shad spawn in mass in the main channel of the river. Larval rearing occurs in the Russian River from May through February. Larvae feed mainly on zooplankton. Outmigration of larval shad occurs from November through February, while outmigration of adults occurs from May through July.

Resident Fish: Smallmouth and Largemouth Bass and Russian River Tule Perch

Smallmouth bass prefer clear rivers with many large pools, abundant cover, and summer temperatures of 14-31°C. Smallmouth bass in California are often associated with native minnows and suckers. As the water warms in the late spring, the bass move into quiet areas of the river. The male will fan out a nest, usually built on gravel or sand bottoms at depths of 1 m, near submerged logs, boulders, or other cover. Nests have been recorded at depths of up to 5 m. Males defend their nests vigorously. Females may spawn in more than one nest, and males may spawn with more than one female. Rearing of smallmouth bass fry in the Russian River occurs from April through October after which the fry become juveniles. Juvenile rearing occurs year round. Spawning occurs from April through June.

Largemouth bass prefer quiet, warm-waters with low turbidities and beds of aquatic plants. In some rivers, largemouth bass are abundant in backwater and warm, deep pool areas.

Adult bass are solitary hunters and may remain in a restricted area usually centered around a submerged large rock or branch or may wander widely. Adult largemouth bass feed on large invertebrates and fishes.

Largemouth bass spawn for the first time during their second or third spring. The males will begin nest building when the water temperatures reach 14 to 16°C, usually in April. Spawning activities will generally continue through June. In the Russian River, spawning occurs from April through June. Spawning nests are generally located in sand, gravel, or debris littered bottoms, at depths of 1 to 2 m; although, some nests may be as deep as 4 to 5 m. The sac fry usually spend five to eight days in the nest or its vicinity. Young-of-the-year bass remain close to shore in schools and swim about in the open. Once largemouth bass exceed 100 to 125 mm standard length they usually subsist primarily on fish.

Tule perch is the only freshwater representative of the Family Embiotocidae, a group of 20 species of viviparous (bearing live young) fish. Three subspecies of tule perch were identified by Hopkirk (1962, 1973)[8]: *Hysterocarpus traskii lagunae* in Clear Lake, *H. traskii* in the Sacramento-San Joaquin River system, and *H. traskii pomo* in the Russian River and its tributaries. The Russian River tule perch is distinct from the other two subspecies in body proportion and gill raker morphology.

The Russian River tule perch requires clear, flowing water and abundant cover, such as beds of aquatic plants, submerged tree branches, and overhanging plants[9], and generally occurs in pools more than one meter deep. The fish are short-lived as compared to other tule perch, living a maximum of 3 to 4 years. The species forms schools which swim and feed together, except during breeding season, which takes place from July through September. During this time, the males will set up and defend territories, generally under overhanging branches and among plants close to shore. After mating, the female will store the sperm until January, when fertilization takes place. In May or June, when food is abundant, the female will give birth to living young. The young are well developed when born, and may reach sexual maturity within a short time, often breeding within their first year. Food for this species includes benthic and plant dwelling aquatic invertebrates.

Moyle (1989)[10] states that this species is "extremely sensitive to stream pollution and tend to disappear from polluted, low flow, turbid streams." Moyle further states that "Coyote and Warm Springs Dams now control flows in the Russian River, resulting in increased turbidity and decreased water quality." Introduced predatory fish may also contribute to population declines of the Russian River tule perch.

<u>Invertebrate Production</u>

Information regarding the aquatic invertebrate species composition and diversity in the Russian River is scarce. Aquatic insects identified from bottom samples collected during a study by Hopkirk (1980) are presented in Table 3 of Appendix D. Hopkirk reported that side channels and riffles of the main channel revealed a healthy fauna. The data collected indicated that a strong correlation exists between substrate size and species diversity: the larger the particle size,

the greater the diversity. This correlation is valid only for the macro-benthic insects such as mayflies, stoneflies, caddisflies, damselflies, and dragonflies.

Competition and Predation

Salmon and Steelhead Trout

Salmon and steelhead young compete for food in the freshwater system. The major food sources include a variety of terrestrial and aquatic invertebrates and fish. While in the Russian River, chinook salmon young compete for food with coho and steelhead. Chinook and coho salmon adults and steelhead compete for spawning areas.

The outmigration of young salmonids exposes them to a variety of resident predators in the Russian River, including squawfish, smallmouth bass, and largemouth bass, as well as other members of the centrarchid family. Salmon fry and smolts in the Russian River are also subject to predation by various mammals, fish-eating birds, and non-resident fish species. Non-resident predatory fish species that feed on salmonid young include coho, chinook and steelhead smolts. For example, steelhead smolts in the Russian River are subject to predation by coho smolts. Human activities also contribute to mortality among rearing, outmigrant, and adult salmonids through water diversions and impoundments, fishing, water pollution, and so on.

It has been observed that when two or more species of juvenile salmonids occur within the same stream, interactions between the two species and temperature regime can result in habitat partitioning. Habitat partitioning is when one species occupies some habitat types or food sources, while another uses, or is forced to use, other habitats.

Smallmouth and Largemouth Bass

The food of adult smallmouth bass consists primarily of insects, crayfish and fishes. The size of food taken increases as they grow older, going from a diet of plankton to immature aquatic insects, to crayfish and fishes. Smallmouth bass are eaten by various predators including humans, sunfishes, catfishes, and fish-eating birds.

Smallmouth bass compete with a variety of fish species with similar habitat requirements for food and nesting areas.

Largemouth bass are largely fish-eating predators but food type changes as the fish grow; from plankton, to insects, to fish, crayfish, and frogs. Fish enter the diet of the largemouth bass at about 50 mm in length. Largemouth bass will feed on just about any available fish species of the appropriate size. Cannibalism in largemouth bass is higher than smallmouth bass. Largemouth bass 40 to 47 mm in length are known to have eaten bass as large as 24 to 30 mm in length.

Largemouth bass are preyed upon by a variety of predators including humans, fish-eating birds, and other predatory fishes that share the same habitat, such as smallmouth bass and squawfish.

Significant egg and fry predators on largemouth bass include crayfish, dragonfly larvae, predaceous diving bee larvae, squawfish, and other centrarchids. Adult largemouth bass compete for food with all of the other predaceous fishes in their habitat, and with other centrarchids for spawning areas.

American Shad

American shad are plankton feeders. Larvae and young American shad eat copepods and related crustaceans and insect larvae while they are in freshwater. Migrating adults eat little, if any, prior to spawning, but commence feeding upon their downstream migration. Young shad probably fall prey to a variety of predators in the Russian River, including smallmouth and largemouth bass and squawfish.

Russian River Tule Perch

The Russian River tule perch is a small fish, and as such is highly susceptible to predation by introduced centrarchids (bass and sunfish), as well as native predators such as squawfish. This species is highly dependent on cover to avoid these predators. Cover also helps them avoid strong currents to which they are not well adapted.

Physical Habitat

The Russian River between Wohler Bridge and Digger Bend (just upstream of the town of Healdsburg) is a low gradient river composed primarily of pool and run habitat types. Dry Creek is the only major tributary to the Russian River in the study reach, entering the river approximately 0.7 miles below the Highway 101 bridge. Water is withdrawn from the Russian River at various locations for municipal and agricultural uses.

Hydrology

Flows though the study reach during the summer months are governed by instream flow releases from Coyote Dam below Lake Mendocino, input from several tributary streams between the dam and the upstream end of the study reach, and instream flow releases from Warm Springs Dam on Dry Creek. Minimum instream flow releases from Coyote and Warm Springs Dams vary depending on the type of water year. The releases from Coyote Dam are required to provide the indicated amount of flow from the release point at the dam to the mouth of Dry Creek.

Lower flows at the downstream end of the study indicate that during the summer months this is a "losing" reach when more flow is lost through diversion and ground-water outflow than is added by Warm Springs Dam.

Section 4.3 of this Draft EIR/EIS discusses the hydrologic characteristics of the Russian River within the study reach. Additionally, Section 3.1 in Appendix D provides a detailed discussion of Russian River hydrology as it relates specifically to fisheries habitat along the study reach.

Instream flow releases are made from Warm Springs Dam to provide water for the Warm Springs Fish Hatchery and downstream fisheries. Because water releases are coordinated with the fish hatchery, release flows are generally in a temperature range suitable for salmonids.

Maximum summer temperatures exceed 20°C from May through September, and exceed 24°C in July. A long-term median daily temperature exceeding 20°C may impair growth in salmonids. A maximum temperature of 24°C is lethal to steelhead. While maximum temperatures of 26°C are lethal to chinook and coho salmon, preferred temperatures for these species range from 3.3 to 20.6°C.

Dry Creek has a moderating influence on water temperatures in the Russian River, being several degrees cooler, and contributing nearly half as much water as is in the river above its confluence during a normal rainfall year.

Habitat Mapping

To determine the effect that proposed mining and reclamation plans for gravel mining operations will have on the fish habitat structure of the Russian River, habitat mapping was conducted from Wohler Bridge to Bailhache by Entrix Inc. Habitat types were mapped using aerial photographs with a scale of 1 inch equals 400 feet. Using these photographs and topographic maps of the area, the study reach was divided into three segments based on hydrology. The first segment extends from Wohler Bridge to Dry Creek (the only major tributary within the study reach), the second segment extends from Dry Creek to Healdsburg Dam, and the third segment extends from Healdsburg Dam to the Riverbend site (see Figure 4.6-2).

Subsequent to habitat mapping, biologists canoed the river from Healdsburg Dam to Wohler Bridge and confirmed the accuracy of the aerial habitat mapping. The biologists also evaluated cover (cover is defined as hiding places where fish can seek refuge from a variety of aquatic and terrestrial predators), and determined dominant and subdominant substrate size and maximum depths for selected habitat units. These are important elements of the habitat structure, and could not be identified from the aerial photographs. Overall, biologists were able to confirm the accuracy of 78 percent of all habitat units mapped from aerial photos. All of the habitat units in Segment 3 (above Healdsburg Dam), and the lower two miles (comprising 13 habitat units) of Segment 1 (below Dry Creek) were affected by backwater from Healdsburg Dam and Wohler Dam, respectively and could not be field checked. Habitat mapping results are presented in Appendix D, Table A-1 of Technical Report 1.

The summer dams at Wohler Bridge and Healdsburg Dam are erected between Memorial Day and Labor Day each year. These dams create substantial backwater areas, which provide good habitat for warm-water fish species, but also contribute to the high water temperatures in the river in the summer months. Wohler Dam is equipped with two fish ladders to allow for upstream migration of anadromous fishes. These ladders are reported to be ineffective for shad as a result of behavioral characteristics that prevent shad from entering the narrow mouth of the ladder.[11]

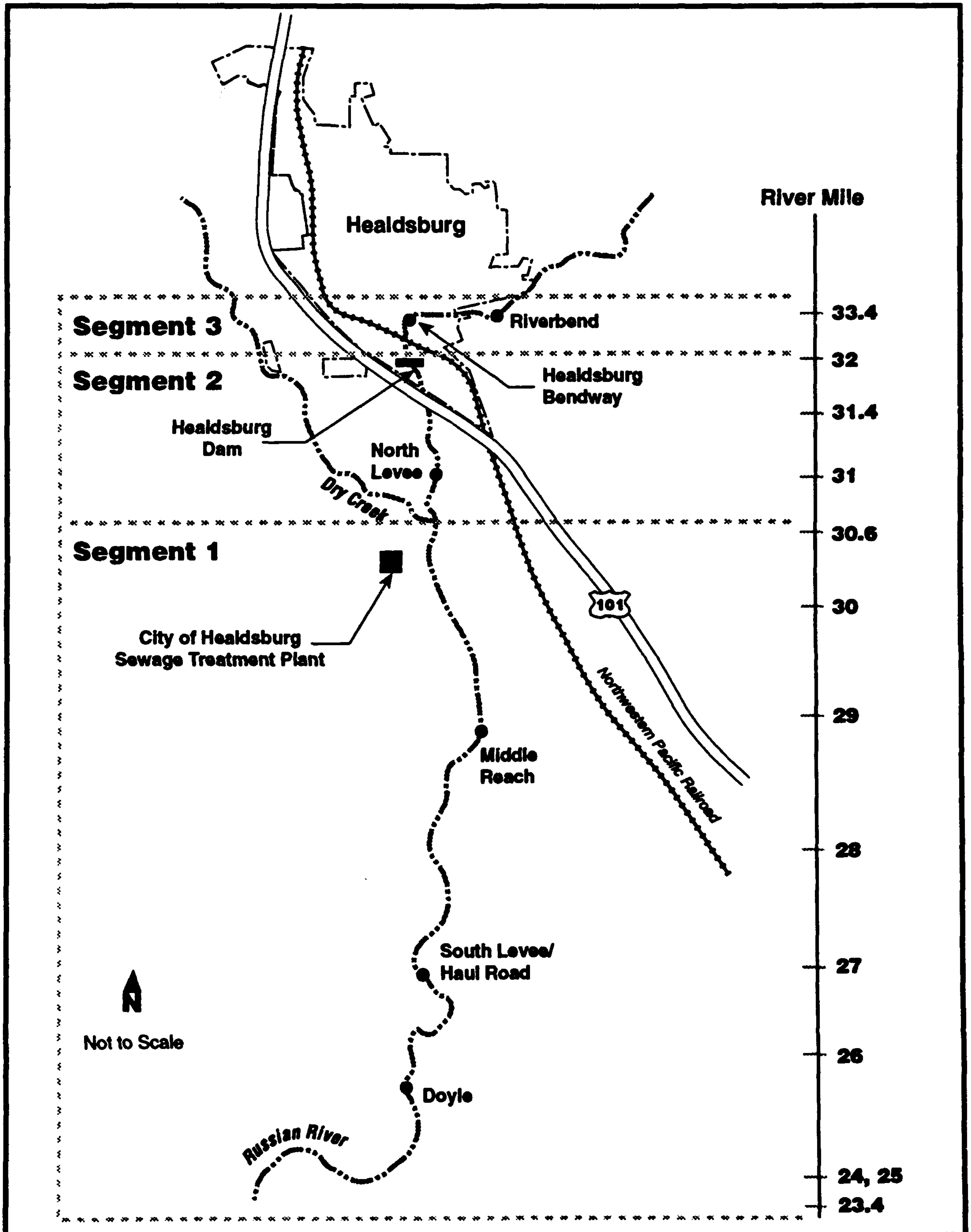


Figure 4.6-2
Habitat Mapping Segments

The Healdsburg Dam is not equipped with fish ladders, and it blocks upstream passage by shad and salmonids during the period when both the dam and the salmonids are in the river (see Figure 4.6-1).

A description of the criteria used to assess habitat features and a summary of the habitat features for each segment is presented in Appendix D, Table 5 in Technical Report 1.

Segment Descriptions

Segment 1, the stretch of river between Dry Creek (RM 30.7) and Wohler Bridge (RM 23.7), is a relatively straight reach of river, with two 90° bends at the most downstream end. The river migrates from one side of the channel to the other, creating a series of alternate bars supporting varying degrees of riparian growth. Runs are the dominant habitat type in this segment. Pools make up a somewhat smaller proportion of the total reach length, and riffles comprise only a small percentage of the length of the stream.

Generally the deepest portion of the channel is on the outside of the bends and is associated with overhanging willows and other riparian growth. This overhanging vegetation, along with logs and trees that have fallen into the stream as a result of bank erosion, provides nearly all of the cover, in terms of velocity shelter, refuge from aquatic predators, and overhead cover from terrestrial predators. It also serves to create and maintain scour holes which provide deep water shelter for larger fish.

The floating seedbox (*Ludwigia peploides*) is fairly abundant throughout this segment in pools and runs. This plant sometimes forms mats of vegetation hundreds of feet long and up to nine feet wide along the banks, providing excellent habitat for juvenile fish, with good cover from both aquatic and terrestrial predators.

Dominant sediments in this reach tend to be sand in pools, medium gravel in riffles, and large gravel in runs. Subdominant substrates range from medium gravel in pools to sand in runs. Substrate larger than cobble (75 to 150 inches in diameter) was rarely observed in this segment, indicating that substrate does not provide a substantial amount of cover in this segment. Large quantities of sand and other fine substrates (fines) make the gravels in this segment less than ideal for spawning salmonids. However, these substrates are probably acceptable for spawning American shad, smallmouth and largemouth bass, suckers, and squawfish, which are less effected by the amount of fine sediments in the gravels where they spawn.

Several shallow, side-channel areas provide excellent rearing habitat for juvenile warm-water fishes such as suckers and squawfish. These areas may also provide rearing habitat for juvenile salmonids during the spring outmigration. During the summer months these areas are unlikely to provide rearing habitat for juvenile salmonids because of warm water temperatures. Pools may serve as rearing areas for warm-water species when beds of floating seedbox or other types of cover are available, but the presence of such piscivorous fish as squawfish and the two bass species make these areas unsuitable for juvenile fish without cover.

Holding habitat for adult salmonids is provided by pools and scour holes, especially where associated with overhanging vegetation. There do not appear to be any passage barriers in this reach at either low or high flows; however, the summer dam at Wohler Bridge may present a barrier downstream of the study area. This dam is equipped with two fish ladders to allow for upstream migration. Adult rearing habitat for warm-water species such as squawfish, suckers, and bass is provided in numerous pools and runs.

As noted previously, salmonids do not presently use the mainstem of the river for spawning, except when they are unable to reach the tributary streams. Potential spawning habitat for salmonids in this segment is probably limited to riffles, as a result of the large amounts of sand and fines in other habitat types. Runs in this segment generally have too much fine sediments in the gravels to make them suitable for salmonid spawning. American shad are also reported to spawn in riffles, but their spawning success is less likely to be affected by the amount of fines in the sediments. Spawning habitat for both species of bass is found in the numerous pools at depths between 1 and 2 meters. Many of the pools may provide poor quality spawning habitat due to lack of cover objects near which bass prefer to construct their nests.

Food production in Segment 1 may be low for salmonids and other juvenile fish, because riffles are few in number and represent only 6 percent of the total habitat. Raleigh, et al. (1984 and 1986) cite a pool to riffle ratio of 1:1 as an optimal mix for food producing and rearing habitats for rainbow trout (steelhead) and chinook salmon.[12] The pool to riffle ratio in Segment 1 is nearly 7:1. Riffles are the most productive areas of riverine environments in terms of aquatic invertebrates, especially for the invertebrates on which young salmonids feed during their freshwater rearing lifestage.

Segment 2 lies between Healdsburg Dam and the mouth of Dry Creek. This reach is the shortest of the three, and is disrupted by the yearly construction and washing out of the haul road crossing just upstream of the Highway 101 bridge and the stream crossing on Dry Creek just upstream from its confluence with the river.

The crossings are constructed during May of each year. The Russian River crossing diverts the river through a narrow underpass on the east bank of the river. The channel through which the river is diverted was very healthy and productive-looking during site visits, with a good assortment of substrates and good shading provided by bankside vegetation. However, some of this diversion channel and areas farther downstream are adversely affected in the winter months, during high flow events. When the crossing washes out, there is a large input of fine sediments, which may bury or scour invertebrate habitat and potential spawning areas, rendering them unusable until these sediments are washed away. The road crossing also causes a large, shallow pool to form between the crossing and the base of the Healdsburg summer dam. This may contribute to the high temperatures, which exclude salmonids from the main river during the summer months. The warm water temperatures do benefit warm-water fish, and provide excellent rearing habitat for juvenile warm-water fish. Mats of floating seedbox also provide good habitat for juvenile, warm-water fish in the pool created by the Russian River crossing.

The Dry Creek crossing is a culvert and fill crossing using 3 pipes approximately 80 inches in diameter. These pipes, typically, are removed before November 1 each year. This crossing did not appear to cause much of a pooling effect on upstream areas during a summer field visit, when approximately 25 cfs were being released due to the drought conditions. Velocities in the culverts were not impassable to salmonid at this flow; however, they may present a barrier to the Russian River tule perch, which are reported to use Dry Creek for spawning, and are not adapted to swift flows. While no data were available on their swimming abilities, Moyle (1989) implies that they are relatively poor swimmers, and can exist in areas of fast velocity only by seeking velocity refuges. During years of normal rainfall, instream flow releases will be 80 cfs. It is unknown whether velocities at this flow would present a problem for salmonids passage. American shad do not use the tributary streams, so this crossing would not present a passage problem for this species. The crossing may increase sediment loads in the winter when the culverts have been removed, and the fill gravels are left to be washed out by the stream.

Segment 2 has a large side-channel area, which provides excellent rearing habitat for juvenile, warm-water fish. This areas is just upstream of the mouth of Dry Creek, where an island creates a shallow run with low velocities on the west side of the channel. Mats of floating seedbox in the pool created by the haul road crossing also provide rearing habitat for these fish. This plant was observed elsewhere within the segment, but only in small patches.

Dominant substrates in this segment are sand in pools, cobble in riffles, and medium gravel in runs, with the subdominant substrates being mainly gravel. Additionally, this was the only segment that has cascade habitat. The sole cascade is formed by a bank of boulders immediately downstream of Healdsburg Dam. This habitat unit was relatively short, and this is its only occurrence, so it is not an important aspect of the rearing habitat for this section. It is a passage barrier, however, in that it blocks the upstream migration of American shad during most years. On rare occasions the shad may get past this barrier when flow conditions are appropriate.

Adult salmonid habitat in this section was judged to be relatively poor, because of lower amounts of overhead cover, fewer deep pools, and the lack of velocity shelters in faster water. The exception to this is an area just below the cascade. This area is deep enough to provide overhead cover, and the lowermost boulders of the cascade provide velocity shelters for the fish prior to their passage through the cascade.

Again, salmonids are not thought to spawn in the mainstem of the river, except when they are unable to reach the tributary streams. However, potential spawning habitat for salmonids can be found in the riffles, runs, and the tailout of pools, especially those in the diversion channel upstream of where the sediments released by the erosion of the river crossing would effect them. This area, however, is relatively small, and could not accommodate very many redds. American shad also spawn in riffles, but their spawning success is not influenced as greatly by the amount of fines in the gravels. Shad also spawn during the summer months and so their eggs are not vulnerable to being buried by fine sediments when the Russian River Crossing washes out. Spawning habitat for both bass species is available in pools at depths between 1 and 2 meters.

Segment 3 is characterized by the inundation the entire segment experiences each year from late April through Labor Day weekend when Healdsburg Dam is in place. This segment was inundated during the field reconnaissance surveys, so the aerial habitat mapping could not be confirmed from the ground. Only four habitat units were identified in this segment from the aerial photographs, two pools and two runs. The pools made up 40 percent of the overall habitat, while the runs made up the remaining 60 percent.

Habitat in this section is probably good for bass, squawfish and adult salmonids, but poor for juvenile fish because of the presence of large predators. American shad generally do not get past the cascade below Healdsburg Dam[13]. Spawning habitat for both species of bass is quite good, because of the large pool formed by Healdsburg Dam, unless fluctuations in water level expose the nests. Because both bass species spawn from April through June, the depth of the nests will only increase with the erection of Healdsburg Dam. Consequently, these changes in water level are unlikely to affect the reproductive success of the bass. Bass prefer to spawn near structural objects such as logs or boulders. It is not known whether there is a sufficient quantity of these objects within the segment.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this EIR/EIS, an adverse impact on fish resources will be considered significant if it causes any of the following circumstances:

1) An alternative diminishes the population of a rare or endangered fish species, or substantially diminishes or degrades its habitat. According to CEQA standards, an animal is considered to be endangered if "its survival or reproduction in the wild are in immediate jeopardy," and considered to be rare if "...the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens." In addition to species that are officially listed by the state or federal government, or are candidates for federal listing, an animal species is to be considered rare or endangered if there is data that indicates that this species meets the criteria for state listing (CEQA Section 15380).

2) An alternative substantially interferes with the movement of any resident or migratory fish species. "Substantial interference" for salmonids (and other anadromous fishes) would involve any hinderance in up migration that would result in delays or decreased survivorship of the spawning adults, and that would in turn result in demonstrable reductions in spawning success. Additionally, if out migration of adults (steelhead) and particularly juvenile salmonids is hindered by instream obstacles, enhanced predation, or increased temperature to the extent that it demonstrably reduces passage of out migrants to the ocean, this is considered substantial interference.

Substantial interference for the endemic tule perch would involve any impacts that can be demonstrated to hinder the survivorship and fecundity productivity of the species.

3) An alternative substantially diminishes or degrades habitat for fish. "Substantial" degradation would involve impacts that can be demonstrated to: 1) reduce the availability of key food items , 2) reduce water quality, 3) enhance predation, or 4) degrade spawning substrates to the extent that the reproductive success of salmonids or warmwater fishes is demonstrably reduced.

Method of Analysis

To determine the effect that the proposed gravel mining operations would have on the habitat structure of the Russian River, habitat mapping was conducted from Wohler Bridge to Bailhache. Habitat types were mapped using aerial photographs with a scale of 1 inch equals 400 feet. Using these photographs and topographic maps of the area, the study reach was divided into three segments based on hydrology. The first segment extends from Dry Creek to Wohler Bridge, the second segment extends from Healdsburg Dam to Dry Creek (the only major tributary within the study reach), and the third segment extends from the Riverbend site downstream to Healdsburg Dam (see Figure 4.6-2).

Subsequent to habitat mapping, biologists canoed the river from Healdsburg Dam to Wohler Bridge and confirmed the accuracy of the aerial habitat mapping. The biologists also evaluated cover (cover is defined as hiding places where fish can seek refuge from a variety of aquatic and terrestrial and predators), and determined dominant and subdominant substrate size and maximum depths for selected habitat units. These are important elements of the habitat structure which could not be identified from the aerial photographs.

Project Impact

4.6-1 An increase in the amount of deep pool habitat in the river could increase the vulnerability of outmigrating anadromous fish and Russian River tule perch to predation.

While there is a lack of deep pool habitat in the Russian River, it is expected that the fish populations that would benefit from the increase would be introduced, including predatory species such as smallmouth and largemouth bass and squawfish. The increase in deep pool habitat, as well as the populations of predators occupying these habitats, may result in increased predation on outmigrating salmonids and American shad, as well as the resident Russian River tule perch. The San Joaquin Salmon Planning team has stated in their 1991 Scoping Session Document that:

> predation can be the major source of mortality for outmigrating juvenile salmon (Foerster and Ricker 1941; Ricker 1941; Jonson 1965; Neave 1953; Ricker 1962; Peterman 1978; Poe and Rieman 1988). There are some reasons why predation might be expected to be an even greater problem...

- A number of predatory game fishes have been introduced into the system, most importantly smallmouth and largemouth bass

- In-river aggregate mining has created wide, deep pools up to several miles long with conditions more lake-like than stream-like. These areas provide excellent habitat for predators such as bass and ideal conditions for high predation rates.

...when salmon populations are already low (because of overharvesting, spawning gravel limitations, etc.), predation can cause the population to crash and remain depressed (Peterman 1977). If too few juveniles are produced to saturate the predators, the predators can take very high percentages of the salmon and drive the population down to a very low level.

A-1, A-3 through A-5

Under these alternatives, no new deep pool habitat would be created, so no adverse or beneficial impacts associated with pool creation would occur. Therefore, this is considered a ***less-than-significant impact.***

A-2 In the reclamation plans submitted by the project proponent, it is suggested that rearing habitat for juvenile salmonids is absent from the Russian River because of the absence of thermal refugia, and that the creation of deep pools may provide this cool water refuge habitat. However, data collected during June 1991 indicate that existing pools in the river as deep as 12 feet do not stratify (Table 7 in Appendix D). This does not prove that stratification will not occur; however, it indicates that thermal stratification is unlikely. Even if stratification does occur in pools that would be created under the proposed project, it is doubtful that they would provide significant summer refuge for juvenile salmon. These areas would contain bass and other predators, reducing the utility of these habitats to juvenile salmonids and other small or juvenile fish. The proposed project calls for the excavation of deep pools at the Middle Reach, Healdsburg Bendway and Riverbend reclamation sites. As noted above, the creation of such pools will generally improve conditions for warm water resident fishes, such as large and smallmouth bass and squawfish, but will likely subject outmigrating salmon, steelhead, and shad and resident Russian River tule perch to increased predation. Because of the potential adverse effects on migratory fishes and the federal candidate species tule perch, this is considered a ***potentially significant and unavoidable impact.***

<u>Mitigation Measures</u>

Implementation of the following mitigation measures would reduce the above impact, *but not to a less-than-significant level.*

4.6-1(a) *To determine the effectiveness of the proposed instream, deep pools in providing cool-water habitat for salmonids, created pools shall be monitored. Temperature and dissolved oxygen profiles shall be taken at 3 to 5 cross-sections across each created pool (depending on the size of the pool), with sampling stations located at one quarter, one half, and three quarters of the distance from the right bank*

to the left bank and one additional station being collected at the deepest part of the cross-section. Profile measurements shall be collected monthly from June through September to cover the entire period when daily median water temperatures exceed 20° C. This information shall be collected for one dry and one normal flow year to allow assessment of how the different flow regimes affect any stratification that might occur. To save time and money, initial measurements for each station may be taken at the surface and the bottom to determine if temperature differences of greater than 2° C exist. If they do not, then stratification has clearly not taken place, and no further measurements are needed at that location. If a temperature differential of 2° C or more does exist, then a complete profile shall be collected at that station. Measurements shall be taken at 1-foot intervals to allow clear delineation of any strata that develop. If cool-water habitat is created, then these cool strata shall be surveyed using snorkeling or scuba techniques to assess whether or not this habitat is being used by juvenile salmonids (the stated purpose for the creation of the pools). If they are using the pools, then the reclamation can be judged a success, and no further action needs to be taken. This mitigation measure is required for Alternative 2.

4.6-1(b) *If juvenile salmonids are not using the cool-water habitat of the pools, then additional mitigation measures will be taken as determined appropriate by the County, including, but not limited to: placement of a variety of cover objects on pool bottoms, and/or implementation of predator control programs.*

If, during monitoring by a qualified fisheries biologist, lack of cover is determined to be adversely affecting resident fish (especially the Russian River tule perch) or migratory salmonids, a variety of cover objects shall be installed and monitored in subsequent years to see if they are being used. If use of the pools by the target species does not increase, different types of cover shall be tried.

If the presence of large predators is determined to be affecting fish populations of concern, cover objects shall be placed to provide small fish refuge areas from predators. If necessary, predator populations shall be controlled through a variety of programs, such as bass tournaments, or selective gill netting. This mitigation measure is required for Alternative 2.

The most likely reasons for salmonids to avoid these habitats would be low (< 5 mg/L) dissolved oxygen concentrations (which would be indicated by the temperature and dissolved oxygen profiles discussed above), a lack of cover, the presence of large predators, or an insufficient food supply. As stated above, if data collected through the implementation of Mitigation Measure 4.6-1(a) indicates that the created pools maintain suitable conditions for salmonids and do not adversely affect tule perch, the pool creation would have a beneficial effect on the fishery and no further mitigation would be required. If, however, data indicates that adverse conditions exist but are mitigable, implementation of appropriate mitigation measures should be carried out as described in Mitigation Measure 4.6-1(b). As these measures are largely untried, monitoring of

their implementation is crucial. If data indicates that mitigation measures are or would be ineffective, the impact would be considered significant and unavoidable.

Project Impact

4.6-2 Fish could be stranded in isolated areas of the existing stream channel when the channel is dammed and diverted during the excavation of deep pools.

The construction of temporary dams to divert the river around areas proposed for deep pool creation may result in the formation of isolated pools in the channel behind the dam. It is anticipated that most fish will move downstream as the water drains from the river channel once the temporary dam is in place, but it is expected that some fish will be trapped in pools as they become isolated from the river channel.

This would probably have little effect on outmigrant salmonids, since most of them would be out of the system during the May 1 through October 15 window when instream mining is allowed. Some steelhead, chinook, and coho outmigrants, however, are still in the river through May (see Figure 4.6-1). American shad fry and adults would be in the river at the time this mining would take place, as would the resident warm-water species (bass, suckers, squawfish) and the Russian River tule perch. There would be a greater potential for these fish to be stranded or trapped in isolated pools, although it is likely that most of these fish would move downstream when they detected the declining water levels. Some fish, however, would undoubtedly be trapped. The fish that were trapped in these pits would probably be killed by ensuing excavation activity, either through direct mechanical injury, removal from the water, or the high turbidity levels that would result from the mining within these pools. It is impossible to quantify this loss for any species or lifestage, but some losses would be unavoidable. These losses could range from minor to moderate depending on the channel morphology within the reach to be diverted and the extent of pooling that occurs.

A-1, A-3 through A-5

These alternatives would involve no channel diversions and would, therefore, have a ***less-than-significant impact*** on fish due to diversion.

A-2 The Proposed Project calls for creation of deep pools in the Middle Reach, Healdsburg Bendway and Riverbend reclamation sites. As discussed above, the creation of such pools may result in the stranding of some fish. It is impossible to accurately predict the extent of this impact on the local fishery. But because of the potential for harm to individuals of the federal candidate species, Russian River tule perch, the potential adverse impact resulting from the excavation operations is considered ***significant***.

Mitigation Measures

Implementation of the following mitigation measures would reduce impacts to a *less-than-significant level*.

4.6-2(a) *Placement of the diversion dam (and therefore the start of instream excavation) shall not begin until after June 1 of each year. This mitigation measure is required for Alternative 2.*

4.6-2(b) *A qualified biologist shall conduct fish rescue operations for game fish and the Russian River tule perch subsequent to the placement of each dam and prior to the commencement of mining. Fish from these rescue operations shall be placed in the river either upstream or downstream of the project area. This mitigation measure is required for Alternative 2.*

Project Impact

4.6-3 Bar skimming and pool excavation operations in and adjacent to the Russian River stream channel would result in the removal of riparian vegetation, which could cause a reduction in available cover to adult and young fish, a reduction in the input of terrestrial invertebrates from the streamside, and increases in stream temperature.

In general, the removal of riparian vegetation from stream systems tends to produce a variety of effects that may influence the productivity and survival of fish populations using those systems. These effects include but are not limited to: 1) reduced cover availability for adult and young fish, 2) reductions in the input of terrestrial invertebrates to streams, 3) potential increases in bank erosion and stability resulting in increased siltation, and 4) increased water temperatures due to a reduction in stream shading. These effects were key considerations in the evaluation of potential impacts on Russian River fish populations associated with each of the project alternatives presented in this EIR/EIS.

The anticipated removal of riparian vegetation associated with each alternative is detailed in Section 4.7, pages 4.7-17 through 4.7-19. As discussed in that section, skimming operations would remove in channel riparian vegetation from skimmed bars and along graded access roads. Excavation within the low-flow channel would affect early and mid-successional riparian growth adjacent to that channel.

The removal of riparian vegetation may also increase stream temperatures due to reduced shading. The importance of shading in determining the water temperature of the Russian River is unknown, but loss of shading has been reported to be a cause of increased water temperatures in other rivers. As noted earlier, water temperature is thought to be a major factor influencing fish distribution in the Russian River.

The loss of cover in riffles would provide less rearing habitat for salmonids. This could result in the need for rearing salmonids to find other cover and increase their exposure to predators. An overall reduction in salmonid recruitment could occur due to the reduced rearing habitat. The Russian River tule perch is also highly dependent on cover as refuge areas from predators. Removal of cover objects would increase the amount of predation on this species, as well, probably resulting in a decrease in the numbers of tule perch.

The overall impact of the effects discussed above is somewhat mitigated due to several factors. For example, the Russian River is a large, wide river, with a primarily north-south orientation, and little riparian or topographic shading. Because of these factors, riparian shading is not likely to play a major role in controlling river temperatures[14]. The removal a small percentage of established riparian vegetation, over several limited sections of the river, is not anticipated to change the temperature of the river.

Additionally, because the river is relatively large, the input of terrestrial insects from riparian vegetation forms only a small portion of the food base for fish, with the majority of the food base provided by aquatic insects produced within the stream channel.[15] Therefore it is unlikely that the loss of insects resulting from scattered removal of riparian vegetation associated with the alternatives would have a demonstrable effect on Russian River fish populations.

Finally, the potential loss of rearing habitat for salmonids resulting from the potential loss of cover in riffle areas may have only a limited effect on the recruitment of juvenile salmonids. The value of the proposed project site for juvenile salmon rearing is already low due to high summer and fall water temperatures which tend to exclude juveniles from the area during those times of year.

A-1 The No Project Alternative would not involve the removal of riparian vegetation. This impact is considered ***less than significant***.

A-2 Alternative 2 proposes ongoing skimming operations on all five instream reclamation sites. Additionally, deep pool excavation is proposed for the Middle Reach, Healdsburg Bendway and Riverbend sites. As is discussed in Section 4.7, Terrestrial Biological Resources, South Levee site skimming operations would affect approximately 12.8 acres of predominantly mid-successional willow-cottonwood woodland. An additional 0.3 acres would be affected by proposed improvements to the existing access road to the site. Proposed mining operations on the Middle Reach site would disturb a total of approximately 9.6 acres of riparian habitat. This is roughly evenly divided between early and midsuccessional habitats. Proposed skimming operations on the four bars within the reach would affect primarily early-successional habitat, while proposed channel excavations, temporary channel construction, and haul road construction would cause greater disturbance to more developed "mid-successional" habitats.

North Levee site skimming operations and haul road development under Alternative 2 would result in the disturbance of 1.9 acres of early successional habitat. Of this total, 0.2 acres would be specifically affected by grading of the haul road.

Healdsburg Bendway skimming operations and construction of haul road access would result in the disturbance of 0.74 acres of early successional riparian habitat under Alternative 2. Proposed construction of the five spurs on the Healdsburg Bendway site would result in the loss of an additional 0.2 to 0.6 acres of mid-succession willow-cottonwood habitat in areas along the north and west banks where the spurs would join the bank.

Riverbend site haul road construction would result in the disturbance of approximately 0.65 acre of early and mid-successional riparian habitat. Areas on the two gravel bars proposed for skimming under Alternative 2 are relatively void of established vegetation; therefore, habitat loss resulting from proposed skimming of these areas would be minimal.

Since most of the loss of riparian vegetation would be due to bar skimming, which would be repeated as the bars aggrade, the loss would be essentially permanent. This would have adverse ecological consequences for the long-term diversity and productivity of the riparian habitat associated with skimmed bars. For reasons discussed above, this may have an adverse effect on anadromous and resident fish populations in the river.

The removal of riparian growth described above would result in a loss of overhead and instream cover within the study area, a decrease in the number of terrestrial insects entering the river, and less shading of the river. As discussed above, however, the effects of riparian removal on fish species, particularly salmonids is mitigated somewhat by several factors including the relatively low contribution of riparian growth to the total amount of food production; the limited effect of shading on Russian River stream temperatures; and the limited use of the project area for juvenile salmonid rearing.

Nevertheless, the removal of riparian vegetation as proposed under Alternative 2 does present the possibility that populations of salmon and tule perch may be adversely affected by the project. Any potential future reductions in the populations of these species must be considered significant in light of past considerable *reductions in historic* population levels of these species. Therefore, the direct impact of riparian removal (associated with the proposed project) on fish resources is considered ***significant***.

A-3 The removal of riparian vegetation under the Gravel Bar Skimming Alternative would be similar to but slightly less than Alternative 2. The impact of this removal is considered ***significant***.

A-4 Although Alternative 4 would allow bar skimming at the Middle Reach and South Levee sites only, acreages for lost riparian habitat are very similar to Alternatives 2 and 3. This is due the relatively limited amounts of existing habitat on the North Levee, Healdsburg, and Riverbend sites. It should be noted that under Alternative 4, the reestablishment of habitat on these sites would be enhanced compared to Alternative 2 and 3. Nevertheless, this impact is considered ***significant*** due to the potential for reductions in fish populations.

A-5 Implementation of the Floodplain Skimming/Streamway Development Alternative would result in the one-time removal of some riparian vegetation adjacent to the river channel. This removal is not anticipated to be significant and would not have a discernable impact on resident or migratory fishes. Additionally, this alternative would provide for expansion of the stream corridor and long-term enhancement of riparian vegetation adjacent to the river. The potential for adverse impact of this alternative on fish resources is therefore considered ***less than significant***.

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.6-3 *Implement Mitigation Measures 4.7-1(a) through (d) and 4.7-7. This measure would be required for Alternatives 2 through 4.*

Project Impact

4.6-4 An increase in fine sediment input to the Russian River could result from the skimming of gravel bars.

Based on the schedule presented in Table 3-2, it is anticipated that as much as 40 acres of gravel bar will be skimmed in any given year under the proposed project or alternatives. Bar skimming would release sediments trapped in the gravel. While mining operations would take place outside of the low flow channel to avoid immediate impacts, the exposed fine sediments would be washed into the river during subsequent high flow events. It is unclear how much difference this contribution of sediment would make in light of sediment inputs from other basin-wide sediment sources, such as agriculture, grazing and logging. These sediments would settle out in other areas downstream. This increased sedimentation downstream of the skimming operation may cause an adverse impact on the downstream fish and invertebrate communities. In the short term, the increased sedimentation would result in the loss of fish and invertebrates due to gill abrasion or burial. The long-term effects include the loss of invertebrates to the system, which would affect the food resource available for the fish species present in the area, and the loss of spawning habitat for bass and American shad, because silt has a low suitability for spawning. Increased sediment input could also be detrimental to the Russian River tule perch, as Moyle (1989) states that this species is sensitive to high turbidities, and the non-reproductive lifestages of other fish species in the river through potential clogging of their gills with fine sediments.

A-1 The No Project Alternative would involve no bar skimming. This impact is considered ***less than significant.***

A-2 Under the Proposed Project, bar skimming would occur at each of the five instream reclamation sites. Substrate analyses conducted by Mitchell Swanson and Associates, Inc. indicate that the subsurface substrates of bars in the study reach have a larger proportion of fines than those at the surface, when fines are described as sediments less than 1 mm in diameter. Table 8 in Appendix C shows that there is generally an approximately four-fold increase in the percentage of fines in subsurface sediment samples. The removal of the armoring layer would lead to increased erosion from the mined area until the armoring layer is reformed. This increase in the percentage of fines, coupled with an increase in the width of the river at high flows, would probably result in a short-term increase in sediment input to the river during the first few high flows subsequent to mining. However, this input would occur at times when sediment load in the river is high due to sediment loads generated by basin-wide activities such as farming and logging.

The anticipated contribution of sediment from skimmed bars would not be demonstrable; therefore, this impact is considered ***less than significant.***

A-3 Bar skimming operations under the Gravel Bar Skimming Alternative would be similar to those of Alternative 2. Therefore the impact is considered ***less than significant.***

A-4 Bar skimming operations would be considerably less than those proposed under Alternative 2. For reasons discussed under Alternative 2, sedimentation impacts for Alternative 4 are considered ***less than significant.***

A-5 Gravel excavation proposed under this alternative would not occur within the main river channel or adjacent gravel bars and would, therefore, not result in increased sedimentation in the Russian River. This impact is considered ***less than significant.***

Mitigation Measures

4.6-4 *None required.*

Project Impact

4.6-5 An increase in silt input could result from failure of proposed soil stockpiles and dikes at the Doyle terrace mining site.

Increased sediment input to the river may occur as a result of dike failure on the Doyle terrace mine reclamation site. The proposed dike would be constructed of stockpiled soils from the Doyle site in an area (roughly 3 acres in size) between the pit and the river channel. The anticipated volume of this stockpile is unknown. The area would be cleared of riparian vegetation prior to placement of soils. This area may become inundated during high flow events. Failure of the dike would result in a massive input of fine sediments into the river, which could coat the river bottom for miles downstream, and destroy spawning areas for shad. Silt has a low suitability for shad eggs incubation, and smothers productive invertebrate habitat until such sediments are washed out to sea. Failure could presumably result either from erosion of the levee during a high flow event or as a result of seismic activity. Text presented in the reclamation plan states that the first cause is unlikely, because the topographic constriction at Wohler Bridge would cause a backwater in this area, which would result in low water velocities, but this has not been verified. The second potential cause of a dike failure is not addressed in this reclamation plan.

A-1 and A-5

Under the No Project and Floodplain Skimming/Streamway Development Alternatives, dike construction and soils stockpiling would not occur on the Doyle site, hence impacts associated with dike failure would be considered ***less than significant.***

A-2 through A-4

The construction of a dike to separate the Doyle Pit from the main river channel, using stockpiled soils from the Doyle site, would occur under Alternatives 2 through 4. Failure of this dike as a result of a flood or seismic event would reduce considerably the value of American shad spawning habitat downstream of the site and adversely affect invertebrate production along that same reach. This impact, therefore, is considered ***potentially significant***.

Mitigation Measure

Implementation of Mitigation Measure 4.6-5 would reduce the above impact to a *less-than-significant level*.

4.6-5 *Implement Mitigation Measure 4.2-3(b). This measure is required for Alternatives 2 through 4.*

Project Impact

4.6-6 The elimination of areas of "riffle habitat" and removal of large substrates (i.e. materials greater than 6 inches in diameter) from bars could adversely affect survival of juvenile fish and the production of aquatic invertebrates.

As discussed under Impact 4.6-3 (page 4.6-21) above, the primary food source for fish in this portion of the Russian River is "benthic" (bottom dwelling) aquatic insects. In turn, "riffle" habitat within the river is the primary producer of aquatic insects used by fish. Reductions in this type of habitat within the low flow channel of the river may result in reduced production of aquatic invertebrates and reduced availability of this food source to resident and migratory fishes.

Skimming operations would remove quality sized substrates (6 to 12 inches) for aquatic invertebrate populations. The loss of aquatic invertebrate habitat could result in a reduction of the aquatic invertebrate population, resulting in a decrease in the food resource available to the fish population. These substrates also serve as cover objects for small fish, such as juvenile salmonids and tule perch. Their removal may result in an increase in predation because of a lesser amount of refuge habitat.

With gravel bar skimming operations, these substrates would be removed from an area that is out of the water for most of the year. These areas, however, may serve to help replenish these substrates to downstream areas. Because the bars are depositional areas, the amount of substrate recruitment from the bars is probably small compared to that from instream sources.

Mining operations would skim gravel from various bars throughout the study reach. It is assumed that gravels from upstream areas would begin to aggrade in the mined areas almost immediately with high flows of the following high flow season. Larger substrates (> 6 inches in diameter), however, would not replenish as rapidly as the smaller substrates because of their

greater weight. As noted above, these substrates are important cover objects for juvenile fish, and provide the best habitat for aquatic insects.

A-1 and A-5

Under these alternatives, cover substrate would not be removed from gravel bars; hence, this impact is considered ***less than significant.***

A-2 Proposed channel excavation/pool creation under Alternative 2 would result in the loss of approximately 27 percent of the available riffle habitat in that give boundaries, and may lead to a substantial reduction in the production of benthic invertebrates, which are a major food source for fry and juveniles of all fish species. This reduction may decrease the success of these lifestages in affected areas, which may affect other lifestages. Construction of the pools would change the current pool:riffle:run ratio of the Middle Reach site from 42.0:6.3:51.4 to 56.0:4.5:39.0.

Additionally this alternative would involve the removal of large substrates suitable for use as cover objects by juveniles and important in the production of aquatic invertebrates. Combined these are considered a potentially ***significant and unavoidable impact.***

A-3 and A-4

Alternatives 3 and 4 involve varying degrees of gravel bar skimming. This would involve the removal of large substrates suitable for use as cover objects by juveniles and important in the production of invertebrates. This is considered a ***significant impact.***

Mitigation Measures

Implementation of the following impact would reduce impacts to a *less-than-significant level* for Alternatives 3 and 4, and reduce impacts, *but not to a less-than-significant level,* for Alternative 2.

4.6-6 *With the commencement of skimming operations on a bar not recently excavated, the "armoring" or top layer of gravels shall be skimmed and stockpiled on a designated area of the bar. At the conclusion of the mining season, this material shall be respread on excavated portions of the bar. This measure would be required for Alternatives 2 through 4.*

This partial replenishment of the armoring layer would provide future substrate for cover and invertebrate production and would also serve to reduce siltation during the first flooding of the excavated bar.

Project Impact

4.6-7 Removal of suitable spawning gravels from bars and the stream channel could affect the spawning success of Russian River salmonids.

Gravel skimming would remove from the river gravel-sized substrate, which is ideally-sized for salmonid spawning. However, as noted previously, salmonids are not known to spawn in the main channel of the Russian River unless access to smaller tributaries is blocked. Additionally, gravels to be removed from bars lie outside of the active summer channel where salmonids prefer to spawn. Consequently, the effect of their removal would be considered negligible.

A-1 through A-5

Potential adverse impacts on salmonid spawning success resulting directly from the removal of suitable gravels from bars and the river channel are considered ***less than significant***.

Mitigation Measure

4.6-7 *None required.*

Project Impact

4.6-8 Maintenance of a terrace pit on the Doyle site (Site 1) could entrap migrating salmonids.

Alternatives 2 through 4 each include reclamation of a terrace mining operation at the Doyle site (Site 1). This operation would enlarge an existing pit created by mining operations previously conducted on the site. The terrace pit is located out of the normal river channel, but is within the normal floodplain. As currently proposed, the pit would be excavated to a depth of approximately 60 feet below the current ground level.

After the terrace pit operations are completed, a high flow channel would be constructed between the Doyle and Passalacqua pits to allow river water to enter the pits and deposit their sediments to meet the requirement that these pits be refilled and reclaimed subsequent to mining. Outmigrant salmonids may enter the pits and become stranded. The salmonids entering the pits would be subject to predation from the bass and panfish, which inhabit the pits. Since water temperatures in the terrace pits are not suitable for salmonids, those fish that escape predation would become thermally stressed and eventually die. The other species adapted to warmer water temperatures would presumably survive and contribute to the fishery within the pits.

A-1 through A-5

Each of the proposed alternatives, including the No Project Alternative, present the potential for entrapment and stranding of salmonid migrants. Salmonids, as well as other

fishes, may be trapped in the Doyle Pit during flood events exceeding 40,000 cfs. This is expected to occur, on average, once every five years. The existing Passalacqua Pit (adjacent to the Doyle site) and the existing Doyle Pit have the potential for entrapping outmigrant juvenile salmonids. The extent to which entrapment occurs has not been quantified. Such quantification would be extremely difficult because of the number of variables that would affect the actual numbers of fish entering the pit. These variables include the timing of the flood event (in relation to the outmigration of salmonids), the morphology of the instream channel, and the propensity of the fish to enter the overflow channel, as well as other factors.

Under Alternatives 2 through 4 the surface area of the existing pits on the Doyle site would be expanded from approximately 20 acres to 45 acres. Additionally, the depth of the finished pit would be extended to approximately 60 feet. The additional volume created by the proposed excavation would exacerbate existing entrapment conditions on the site.

Mitigation of these impacts would be problematic. The various suggestions considered are: 1) construction of a screen on the overflow channel which carries flood waters into the Passalacqua/Doyle Pit areas, 2) construction of a levee across the overflow channel to significantly reduce flood frequency of the pits, and 3) excavation and maintenance of an "escape channel" on the downstream end of the Doyle Pit to prevent isolation of the pit from the river as flood waters recede. The options are not considered feasible at this time. It is unlikely that construction and maintenance of a fish screen within the floodplain would be technically or economically feasible. Additionally, a screen of this type would significantly hinder sedimentation in the pit once mining has ceased, with the result of delaying its reclamation as wetland habitat. The same is true for the construction of a levee. Although the technical aspects or effectiveness of construction of an escape channel have not been fully evaluated, it seems likely that maintenance of a connection between the Doyle Pit and the river would have potential for added entrapment of migrating fishes and potential water quality effects on the river.

For the above reasons, potential entrapment of outmigrant salmonids is considered a ***significant and unavoidable impact.***

Mitigation Measure

4.6-8 *None available.*

Project Impact

4.6-9 Construction of temporary river crossings a Sites 2 through 6 could create barriers to the movement of fish and increase sediment input to the river.

A-1 and A-5

No crossings are proposed for Alternatives 1 or 5. Therefore, the impact is ***less than significant.***

A-2 through A-4

Each of these alternatives involve the construction of temporary crossings. With Alternatives 2 and 3, construction of as many as three crossings may occur during a single season. With Alternative 4, a maximum of two crossings would be constructed during a single season. Under the proposed reclamation plans submitted for the project, temporary bridges would be "culvert and fill" types. This type of crossing may present an obstacle to fish migration, and may result in elevated sedimentation when the crossing is flooded. This is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant level.*

4.6-9 *Use "railroad flat car" type stream crossings exclusively.*

Following submittal of their six reclamation plans, the project proponent, based on discussions with DFG, stated their willingness to use railroad flat car crossings at all proposed excavation sites. These flat car crossings would replace the original proposed culvert and fill crossings, because the former avoid most of the adverse impacts on fish and boating. Flat car crossings are constructed by spanning streams with a modified railroad flat car instead of placing culverts in the stream with aggregate or other substrate on top to create a crossing.

The use of railroad flatcar crossings is unlikely to affect the upstream passage of any of the management species, nor is it likely to cause pooling upstream of the crossings, as is frequently the case with culvert and fill crossings. The ramps that support the flatcars would be composed of gravel, which would erode during subsequent high flows and could result in an increase in sedimentation downstream. The increased sedimentation would result in adverse effects such as those listed in the section on gravel bar skimming, but these would be substantially less than those occurring from the current "culvert and fill" crossings.

Cumulative Impacts

4.6-10 The combined effects of increased sedimentation, habitat loss or degradation, stream diversion, pool excavation, and potential stranding caused by reclamation and mining operations proposed for the study area could adversely affect populations of resident and migratory fish species.

A-1 Under the No Project Alternative, cumulative impacts on fish resources would be ***less than significant***.

A-2 Based on the site specific evaluations, the combined effects of the reclamation plans and proposed mining operations on each of the identified sites are expected to have low to moderate impacts on the fishery populations of the Russian River. The proposed operations at the Middle Reach, Healdsburg Bendway and Riverbend sites are anticipated to have the greatest impact on fish populations, because these operations would involve substantial alteration of the habitat structure of the river. These alterations (resulting from proposed pool construction) would make more of the habitat better suited to adult bass and squawfish, and less suitable for fry and juveniles of all species. These changes in habitat are anticipated to increase predation on outmigrant salmonids to some degree, but the magnitude of this increase cannot be determined. The changes would also result in the loss of riffle habitat, which provides the best areas for aquatic invertebrate production. As stated under Impact 4.6-6, this would result in a lower food supply for fry and juvenile fish, and could result in a decline in the success of these lifestages. All of the riffle habitat lost would be in the Middle Reach site, and any effects from the loss of riffle habitat would be confined to this area.

The cumulative impacts of the mining operations as set forth in the reclamation plan would result in the conversion of 815' of riffles (27% of all riffles) and 5,730' of runs (23% of all runs) into pools (an increase of 37% at the Middle Reach site). This is expected to increase habitat for adult smallmouth and largemouth bass and squawfish, which prefer deep, warm, slow-moving pools as rearing areas. It is not expected to create additional habitat for juvenile salmonids, as speculated in the reclamation plan. During the summer, juvenile salmonids would probably be excluded from these pools by warm-water temperatures, as available information indicates that the created pools would not provide the cooler water temperatures anticipated. The presence of large predators would reduce the utility of these pools for juvenile salmonids during the entire year.

The creation of these pools may increase predation on outmigrant salmonids and shad, through higher predator populations (smallmouth and largemouth bass and squawfish), and possibly predator efficiency. This effect would be most evident in the Middle Reach site, where a series of four pools would be created from riffle and run habitats, in an area where pools do not currently exist. Pools would also be created at the Healdsburg Bendway and Riverbend sites, but these pools are expected to have little or no effect, because these sites are presently largely pool in composition. The magnitude of increased predation is expected to be slight.

The plan would also result in the removal of approximately 16% of the riparian vegetation immediately adjacent to the stream within the project sites, or 10% within the entire study area. This would result in a loss of instream cover, decreased input of terrestrial invertebrates, decreased input of terrestrial nutrients, and an increased input of sediment to the river. The creation of deep-water pool habitat would mitigate the loss of instream cover for adult fish. Fry and juvenile fish are not expected to be able to use

these pools, however, unless substantial amounts of cover objects are added to the pools. Because the overall amount of adjacent vegetation to be removed is relatively small, the effect on fry and juvenile fish populations is expected to be minor. The decreased input of terrestrial invertebrates is expected to have little or no impact on the fisheries by itself, but this loss would be cumulative with the loss of invertebrate habitat caused by the destruction of riffles in the Middle Reach site. The decreased input of terrestrial nutrients and the increased amount of sediment input are not expected to have discernable effects on fish populations.

Some shad, salmonid outmigrants, and resident fish could be trapped and lost during the excavation of the pools at the Middle Reach site. While the magnitude of these losses cannot be determined from the available information, it is expected that the fish would move out of these areas as water levels decline, resulting in low mortalities, which should have little effect on fish populations. This depends to a large extent on the size and extent of the isolated pools that are formed through the diversion of the river around the excavation area.

Salmonids and other fish could be trapped in the Doyle Pit during flood events exceeding 40,000 cfs. It is unlikely that this stranding would be greater than that which currently occurs in the existing Doyle Pit and Passalacqua Pit. The instantaneous flood event required to cause this stranding (40,000 cfs) is expected to occur, on the average, once every five years. Median daily flows of this magnitude occur on the average of once every thirty years.[16] As described under Project Impact 4.6-8, potential entrapment is considered a significant impact.

Increased sediment input is expected, but this would occur during the high-flow period, when background sediment loads are expected to be high. Because inputs from the various sites would be spread over a period of 5 years, and because the inputs would occur during periods of high background sediment loads and should be short-term in nature, the input of sediments is not expected to have any significant effects on fish populations. It could cause a short-term reduction in invertebrate productivity.

In evaluating the cumulative effects of a project on fish resources, it is crucial to take into account: 1) the combined effects of individual impacts such as those described above and 2) the impact that previous projects have had (or are currently having) on those resources. Recent research conducted by W. Nehlsen, et al.[17] has identified a broad decline in native salmon and steelhead populations in California, Oregon and Washington. This decline is largely attributable to habitat loss and damage, and inadequate passage and flows caused by hydropower, agriculture, logging, and other developments. Significant declines in "escapement" for in the fall run of Russian River chinook salmon have been documented with fewer than one adult fish returning to spawn for each parent spawner.[18] In order to help stabilize declining populations of salmonids, the Nehlsen study stresses the maintenance of basic habitat integrity and ecosystem processes in development of resource management plans. Contrary to this study's recommendation, Alternative 2

would result in considerable modification to the existing habitat and the potential for significant changes to the makeup of the current ecosystem.

Given the potential for adverse effects of the project on salmonids and tule perch, in combination with historic declines of these species in the Russian River, the cumulative effects of Alternative 2 are considered ***significant and unavoidable.***

A-3 and A-4

Cumulative impacts associated with gravel bar and terrace mining operations include loss of riparian habitat, potential increases in sedimentation, removal of large substrates, and potential fish entrapment. With the exception of fish entrapment, these impacts are mitigable. With the Doyle site included, cumulative impacts are considered ***significant.***

A-5 Cumulative impacts on fish resources are considered ***less than significant.***

Mitigation Measures

Implementation of the following mitigation measure would reduce cumulative impacts to a *less-than-significant level* for Alternatives 3 and 4. They are not required for 5. Implementation of these measures for 2 would reduce potential cumulative impacts, but not to a level considered *less-than-significant.*

4.6-10 *Implement Mitigation Measures 4.6-1 through 4.6-9. This measure would be required for Alternatives 2, 3, and 4. None are required for Alternatives 1 and 5.*

4.7 TERRESTRIAL BIOLOGICAL RESOURCES

4.7 TERRESTRIAL BIOLOGICAL RESOURCES

INTRODUCTION

This section describes the terrestrial vegetation and wildlife on each of the proposed reclamation sites and discusses the potential impacts on these resources that would result from the reclamation efforts and related mining activities.

Primary sources of information for this section included annual biological resource monitoring reports and associated photographs prepared for Sonoma County by Dr. Phillip Northern from 1981 to 1991, searches of California Department of Fish and Game's (DFG) Wildlife Habitat Relationship data base and California Natural Diversity Data Base, the Aggregate Resources Management Plan and Environmental Impact Report prepared in 1981 by the Sonoma County Planning Department, and the Draft EIR on the Reclamation Plan for the Kaiser Sand and Gravel Company Piombo Pit prepared by Baseline Consulting Services for Sonoma County. The "Vegetation and Wildlife Technical Report" prepared for the Sonoma County Aggregate Resources Management Plan and Environmental Impact Report, July 31, 1992 provides much of the basis for the following analysis. The technical report and the ARM Plan EIR are available from the Sonoma County Planning Department.

Field surveys were conducted by qualified wildlife biologists on July 17, 18, and 19 and September 22, 1991, to assess the type and value of existing wildlife habitat in areas likely to be affected by the proposed project and to locate the presence of active raptor nests and wading bird rookeries on-site. Field surveys were conducted both on foot and by canoe.

SETTING

Project Vicinity and Location

The Russian River flows through a broad, northwest trending valley within the Northern Coast Range. It is likely that riparian vegetation once covered much of the floodplain of the river. Much of this vegetation was cleared for logging, mining, urbanization, and in particular, agriculture between the mid-1800s and the mid-1900s. Presently, only a thin and discontinuous strip of the former riparian forest band remains along the Russian River.

Aerial photography obtained by the U.S. Army Corps of Engineers (COE) in 1945, 1952 and 1958 shows that the river channel within the study area at one time had a significantly more meandering pattern. The photographs also show that large patches of riparian forest existed between the vineyards, extending in some places up to at least a mile from the riverbank.

The vegetation and wildlife issues on the proposed project site fall under the jurisdiction of a number of agencies and/or regulatory mechanisms including DFG, COE, the Migratory Bird Treaty Act (MBTA), the California Environmental Quality Act (CEQA), the National Environmental Protection Act (NEPA) and the Sonoma County Surface Mining and Reclamation Ordinance. Aquatic resources fall under the jurisdiction of COE (pursuant to section 404 of the Clean Water Act), as well as DFG where those wetlands contain significant vegetation and wildlife habitat values.

Existing Habitats and Associated Wildlife Values

Several general habitat types may be directly or indirectly affected by the proposed project. The habitats are classified according to the multi-agency publication "A Guide to Wildlife Habitats of California"[1], with some modifications. The habitats present within the study area include valley-foothill riparian, unvegetated gravel bars, pond (lacustrine), vineyard, and urban. Each of these habitats is discussed below.

Valley-Foothill Riparian

The proposed reclamation sites contain several types of riparian habitat within the river channel and floodplain, all of which may be lumped into the general category of "valley-foothill riparian". On the leveed terraces above the river, the area is predominantly vineyards.

A general overview of the formation of riparian habitats is provided in the following excerpt from Conard et. al.:

> The riparian zone is a dynamic habitat. The vegetation of a given site reflects the history of flooding, aggradation, and erosion by the river. These habitats are subject to varying frequencies of flooding and lateral erosion by the meandering river. The major riparian plant communities can be aligned along several topographic gradients...The low, recent gravel bar deposits are flooded frequently. Plant cover is low and is dominated by introduced annuals and low perennial. As [higher, outer portions of] gravel bars ... begin to stabilize [due to less frequent flooding], they are colonized by thickets of tall shrub and tree saplings generally dominated by [species of willows]...Riparian forest will become established on lower terrace deposits or as flood frequency decreases. These jungle like gallery forests are dominated by *Populus fremontii* [Fremont's cottonwood] and characterized by a heavy cover of lianas [i.e. vines]... The older, higher terrace deposits support stands of Valley oak woodland...These woodlands gradually thin out and grade into Valley grassland vegetation with increasing distance from the river.[2]

Most of this habitat associated with the floodplain of the Russian River has been converted to vineyard. Valley-foothill riparian habitat on the project site is represented within the river channel by three plant communities: riparian herb-scrub, willow-cottonwood woodland , and riparian forest. These communities reflect the successional stage, or maturity that the valley-foothill riparian habitat has reached in various parts of the study area. This is closely tied to the frequency and intensity of flooding and/or human disturbance of these areas.

Figures 4.7-1 and 4.7-2 show the approximate location of the Russian River riparian zone north and south of the river's confluence with Dry Creek, respectively. Areas within this zone are delineated to indicate the successional stage of riparian development: 1) open areas and immature vegetation, 2) developing riparian forest, and 3) mature riparian forest. The discussion below describes the vegetation types present within the study area and their relative values to local wildlife.

In general, the wildlife value of the valley-foothill riparian habitat in the vicinity of the study area is very high. Wildlife surveys were conducted in 1979 as part of the Aggregate Resources Management Study for Sonoma County.[3] These field surveys have since been collated with other field work and information from other records during preparation of the ARM Plan Update to show that within Russian River riparian habitats there are 270 species of plants, as well as 108 species of birds, 20 species of mammals, eight species of amphibians and reptiles, and 15 species of butterflies.[4]

Riparian Herb-Scrub

The riparian herb-scrub community usually represents an early successional stage of the valley-foothill riparian habitat, and it is the dominant community of lower portions of point bars or disturbed portions of lower terraces on the project site. This corresponds with the "Open Areas and Immature Vegetation" designation in Figures 4.7-1 and 4.7-2.

Point bars extend into the channel from convex portions of the bank where gravel tends to be deposited. An exception to this is the very broad point bar in the Middle Reach (Site 3) of the study area. This has the appearance of growing out of a concave portion of the east bank of the river channel. However, before the river was realigned in the mid 1950s, this bar and low terrace were actually part of the opposite bank of the river.[5] The river was realigned from the east side of this bar to run along the west side, cutting the bar off from the west bank. A gap between the east bank and the bar gradually filled in with sediment, and the bar now appears as if it formed from a concave portion of the east bank.

Lower areas of point bars, which contain the riparian herb-scrub vegetation, include more recently formed portions of the bars that are closer to the river, areas that have been skimmed for aggregate, and areas that have been graded for access roads or flood diversion in the past.

The herb-scrub vegetation on the terrace above the west bank at the Doyle site (Site 1) terrace is very dense, and it does not appear to be developing the typical intermediate willow-cottonwood woodland described below. It is essentially functioning as an intermediate or climax successional stage itself. This terrace is very gradually being invaded by riparian forest tree species associated with the mature or "climax" stage of valley-foothill riparian habitat.[6]

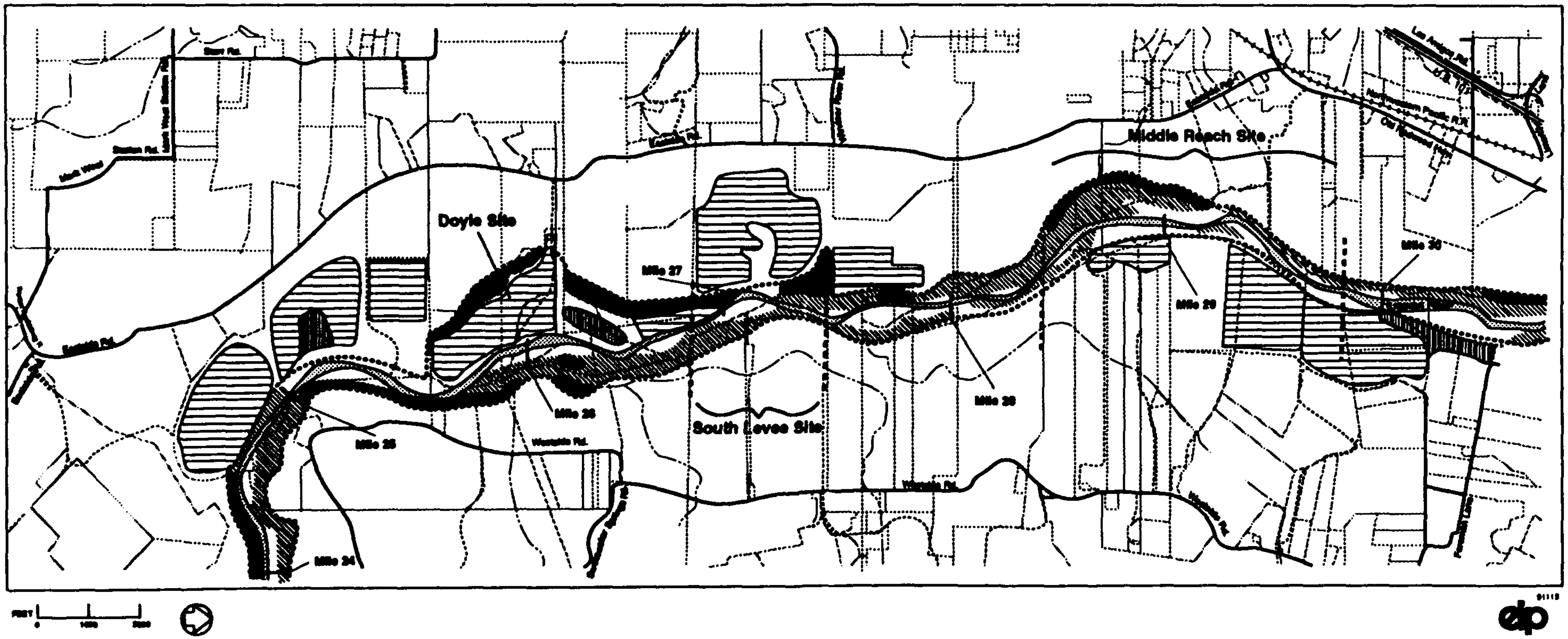
Plants reported as common in the herb-scrub plant community along the Russian River include mule fat (*Baccharis viminea*), coyote bush (*Baccharis pilularis* ssp. *consanguinea*), mugwort (*Artemisia douglasiana*), cocklebur (*Xanthium strumarium*), poison hemlock (*Conium maculatum*), sweetclover (*Melilotus* spp.), and a variety of additional forb and grass species,

Riparian Vegetation South of Dry Creek

Figure 4.7-1

LEGEND

•••••••••••	Edge of Riparian Zone		Mature Riparian Forest (status 4 and 5)
	Existing Terrace Mining Sites		Developing Riparian Forest (status 2 and 3)
	Sites Refilled Above Water Level		Open Areas and Immature Vegetation (status 0 and 1)



elp

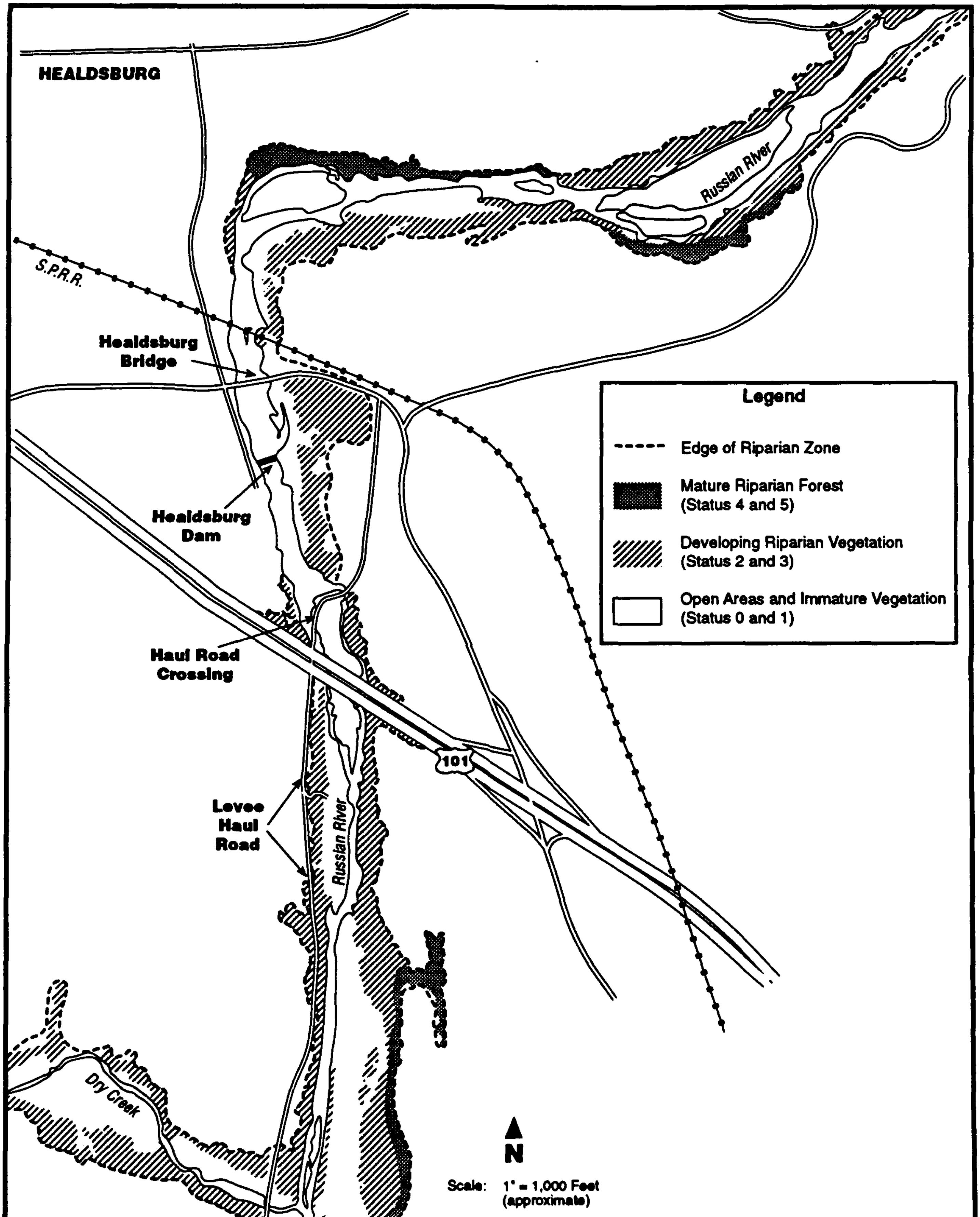


Figure 4.7-2
Riparian Vegetation North of Dry Creek

many of which are not native to California.[7,8] Seedlings and saplings of several species of willow (*Salix* spp.) are also an important component of the herb-scrub plant community, sometimes forming dense thickets. Thickets of blackberry (*Rubus* sp.) and California wild rose (*Rosa californica*) also occur within this plant community.

The herb-scrub plant community provides breeding and foraging habitat for amphibians, reptiles, waterfowl, small shore birds, and small mammals. Blacktail mule deer (*Odocoileus hemionus columbianus*) browse on the vegetation. Mourning doves, California quail and songbirds nest in the dense thickets. These dense thickets are also potential habitat for yellow warbler and yellow-breasted chat, both DFG species of special concern.

The smaller bird, mammal, and reptile species provide a prey base for hawks, owls and predatory mammals such as raccoon, grey fox, and ringtail cat, which are likely to den and breed in the adjacent woodland or forest habitats.[9] River otters forage in ponds, backwaters, and terrestrial vegetation within this community, and den in snags, hollow logs, thickets and burrows.[10]

Willow-Cottonwood Woodland

Willow-cottonwood woodland represents a middle successional stage of valley-foothill riparian habitats and corresponds to the "Developing Riparian Forest" areas shown in Figures 4.7-1 and 4.7-2. It exists on banks and terraces where periodic flooding and/or human disturbance occur infrequently enough for trees to become established and grow to maturity. Willow-cottonwood vegetation also occurs on raised hummocks on gravel bars and low terraces. The hummocks have developed from substrate accumulation in areas that are stabilized by vegetation. The availability of these raised areas is important to the process of succession from riparian herb-scrub vegetation to more mature riparian plant communities found on the gravel bars.[11]

The willow-cottonwood woodland is dominated by Fremont cottonwood (*Populus fremontii*), red willow (*Salix laevigata*), yellow willow (*S. lasiandra*), arroyo willow (*S. lasiolepis*), and sandbar willow (*S. hindsiana*). Understory species include many of the same species found in the riparian herb-scrub plant community, as well as saplings and small trees of the species found in the mature riparian forest community described below.

This plant community provides habitat for breeding, foraging, migration, escape and thermal cover for an abundance of wildlife species, including many of those that also use riparian herb-scrub. Bird species that were frequently observed during three days of field surveys in July 1991 included osprey (*Pandion halieatus*), mourning dove (*Zenaida macroura*), rufous-sided towhee (*Pipilo erthrophthalmus*), rock dove (*Columba livia*), hermit thrush (*Catharus guttatus*), chestnut-backed chickadee (*Parus rufescens*), black phoebe (*Sayornis nigricans*), American robin (*Turdus migratorius*), bushtit (*Psaltriparus minimus*), ash-throated flycatcher (*Myiarchus cinerascens*), and American tree sparrow (*Spizella arborea*).

Riparian Forest

The riparian forest is considered a climax stage of succession in the valley-foothill riparian habitat and corresponds to the "Mature Riparian Forest" areas shown in Figures 4.7-1 and 4.7-2. A plant community is regarded to be a climax community if the species composition is not likely to change substantially within a 500-year period (presuming the site is not disturbed by a catastrophic event).[12]

This plant community exists on alluvial terraces, at a farther distance from the river than the willow-cottonwood woodland. Most of the riparian forest in the vicinity of the study area has been converted to vineyards. Narrow strips of this plant community remain between the vineyards and the cottonwood-willow woodlands or herb-scrub vegetation. Examples of riparian forest exist on both sides of the river channel at Site 1 (Doyle), on the easternmost portions of Site 3 (the Middle Reach) and Site 4 (North Levee), and the northeastern most portion of Site 6 (Riverbend).[13] During the field visits, it was noted that, at Site 1, an additional amount of riparian habitat (approximately 5-10 acres) had been cleared since the 1988 aerial photos were taken.

Riparian forest habitat is dominated by medium to large sized cottonwoods and willows, black walnut (*Juglans hindsii*) and box elder (*Acer negundo* ssp. *californicum*). There are also scattered individuals of Valley oak (*Quercus lobata*). Understory species typically include snowberry (*Symphoricarpos uvularis*), poison oak (*Toxicodendron diversilobum*) and many of the species listed in the description of the herb-scrub community.

In the typical course of riparian succession, black walnut and box elder would gradually be replaced by Valley oak and large cottonwoods as the dominant species of the canopy layer of the forest on high terraces and the floodplain. Black walnut, box elder, and willows would dominate the subcanopy.[14] This Valley oak-dominated riparian forest was likely to have been the type of plant community that was cleared to establish vineyards in the vicinity of the Russian River. Broad stands of riparian forest are evident among the vineyards in aerial photographs taken during the 1950s.[15]

Riparian forests are considered among the most productive wildlife habitats in California. The acreage of this plant community has decreased dramatically in California since the turn of the century.[16] Besides species that may use other portions of the riparian habitat, the tall trees in this plant community are an important source nesting and perching sites for a variety of raptor (bird of prey) species and rookery (communal nesting) sites for herons and egrets.

Regional Availability of Riparian Habitat Along the Russian River

As shown in Figures 4.7-1 and 4.7-2, the amount of riparian habitat within the study area is highly variable from one river mile to the next. This variability is largely associated with past and ongoing human activities such as agriculture, mining, urban development and bridge and dam construction. Near the city of Healdsburg, for example, the riparian corridor is narrow, supporting only 40 to 68 acres of riparian habitat per river mile (at River Miles 30-33). In

comparison, south of Dry Creek, at River Miles 26, 27, and 29, over 100 acres is supported per mile.[17] Data in Table 4.7-1 is reprinted from the 1992 ARM Plan EIR and indicates that most of the habitat is in an "immature" or "developing" stage (35.2 and 38.8 percent, respectively) with 15.6 percent in a "mature" stage. This demonstrates that the system is actively generating new riparian habitat. Most immature stands occupy hummocks of various sizes in the scour zone of gravel bars or in other areas recently disturbed by human activities. The developing stands represent recovery from extensive instream mining in the 1950s and 1960's. Mature stands within the region are found in highly fragmented condition. Only one continuous stand exists: a mature, mixed species stand of 20.8 acres that occupies coalescing hummocks on the east side of the river in River Mile 24 southwest of the Doyle site. This and two other relatively contiguous stands account for approximately 44.7 acres of the 112.6 acres total of mature riparian forest found within the study reach[18].

In addition to "riparian", several other distinct habitat types occur in areas that may be directly or indirectly affected by the proposed project. These are discussed below.

Unvegetated Gravel Bars

Gravel bars may lack vegetation because they have been scoured by floodwaters, "skimmed" to extract gravel, or because the bar is newly formed. While these bars do not provide cover, they do provide shallow access to the river channel (as opposed to a steep bank) for mammals, waterfowl and other wading birds. In certain cases, these bars are small islands, which waterfowl can use as a refuge, since mammalian predators lack easy access to the same bars.[19] Unvegetated gravel bars also provide habitat for reptiles to bask and raise their body temperature.

Gravel bars provide a substrate for riparian vegetation to colonize. Depending on the development of the bar, more mature stages of riparian vegetation may become established. Gravel bars, particularly those not stabilized by vegetation, are also a source of aggregate for the creation and growth of gravel bars downstream from the study area.

Pond (Lacustrine)

The open water within the gravel pits provides foraging habitat on the site for a number of species of birds, including cormorants, kingfishers, wintering waterfowl and possibly osprey, along with other species. The quality of this habitat varies with the existence and size of fish populations, disturbance from dredging or other mining activity, and water quality affecting the aquatic food chains. At present, little freshwater emergent vegetation has established itself in the gravel pits. This lack of cover limits the usefulness of this habitat for some wildlife species. In addition, the steep sides of many of the pits make them fairly inaccessible to mammals.

The open bodies of water within gravel pits attract a variety of wildlife species.

Table 4.7-1
ACREAGES OF RIPARIAN HABITAT IN THE CHANNEL OF THE RUSSIAN RIVER[1]

	Middle Reach		Alexander Valley	
Successional Status	**Total**	**Percent**	**Total**	**Percent**
Open	76	10.5	281	19.5
Immature	254	35.2	706	49.0
Developing	280	38.8	125	9.4
Mature	113	15.6	319	22.1
Totals	723	100.0	1,441	100.0

[1]From the Wohler Bridge to Healdsburg in the Middle Reach and an eleven mile section of the Alexander Valley from Geyserville to Cloverdale.

Note: "Open" consists of unvegetated or sparsely vegetated areas, "Immature" of areas having successional status of 1, "Developing" of areas having status 2 or 3, and "Mature" of areas having status 4 or 5. Successional Status: (Used for all Plant Types. Size categories as listed for trees.)

Vegetation absent = 0
Mature-forest trees (walnut, box elder, ash) absent or seedlings only = 1
Mature-forest trees present in evident numbers and of sapling size = 2
Mature-forest trees present in evident numbers and of small size = 3
Mature-forest trees present in evident numbers and of medium size = 4
Mature-forest trees present in evident numbers and of large size = 5

Source: EIP Associates. Sonoma County ARM Plan and EIR, June 1992.

Vineyard

Vineyards are the predominant habitat type in terrace areas adjacent to the study area riparian zone at each of the six reclamation sites with the exception of Healdsburg and Riverbend. Vineyards consist of grape vines, planted in rows, usually supported by wood and wire trellises. The vines eventually intertwine along the rows, with the area between the rows remaining open. Underneath the vines, herbicides are often sprayed to discourage the growth of herbaceous plants. Herbaceous plants, such as grasses, clovers, or vetch, may be planted between the rows in order to prevent soil erosion.

This habitat is of low wildlife value compared to nearby natural habitats. Deer or rabbits may browse on the vines or ground cover plants, if available. Rodents may nest under the vines and feed in the ground cover.

Urban

Within the borders of Site 5 (Healdsburg Bendway) and Site 6 (Riverbend) are areas that would be classified urban habitat. At Site 5, above the east and south banks of the river, this consists of the Syar aggregate processing facility. This area includes cleared ground, buildings, dirt roads, piles of aggregate or spoils, and structures and equipment involved in processing aggregate. It is highly and continuously disturbed and has negligible value for wildlife.

At Site 6, there is a sparsely vegetated area above the north bank of the river. This lies between Valley-foothill riparian habitat and a housing development. Some wildlife species do commonly occur in open spaces within urban development. These include black-tailed jackrabbit (*Lepus californicus*), striped skunk (*Mephitis mephitis*), a variety of rodent species, scrub jay (*Aphelocoma coerulescens*), brown towhee (*Pipilo fuscus*), and rock dove (*Columba livia*).

Special Status Animal Species

Special status animals include animals that are legally protected by being listed as threatened or endangered by the state or federal government, or by being "fully protected"[20] from take or possession by the state. Besides referring to injury or death of an animal, the term "take" is meant to include the disruption of nests, burrows, or dens during the breeding season.

Special status animals also include species that are candidates for federal listing and DFG "species of special concern". Species in these categories do not usually have the same legal protection as officially listed species; however, most of these species are protected from unregulated take under the California Environmental Quality Act (CEQA) and by other local, state, and federal regulations. Some of these species could be added to official state or federal lists in the near future.

A list of special status animals with potential to occur within the project site is provided in Table 4.7-2. Information used to generate this table was gathered from the California Natural Diversity Data Base (CNDDB)[21], the Aggregate Resources Management Plan, correspondence between Sonoma County and the U.S. Fish and Wildlife Service, a wildlife survey conducted in 1979 as part of the Aggregate Resources Mining Study for Sonoma County, and the results of a survey contracted by Syar for its Healdsburg road crossing.[22]

Species of Special Interest

Red-legged Frog (*Rana aurora draytonii*)
Foothill Yellow-legged Frog (*Rana boylei*)

These amphibians are both DFG species of special concern. The red-legged frog is a Category 2 candidate for federal listing. Category 2 includes species that may warrant listing, but the federal government does not possess adequate information to list the species at this time.

The red-legged frog is generally found in the vicinity of quiet, permanent pools of streams, or marshes, and occasionally ponds. The foothill yellow-legged frog is found in or near rocky streams and rivers in a variety of habitats.

Amphibian surveys were not conducted during the summer field work for this report, as summer is not the appropriate season to determine the presence or absence of most amphibian species in this region. These surveys should be conducted in winter or spring, when adults are active due to the breeding season and tadpoles would subsequently be present in ponds. Additionally, surveys should be conducted on a particular site within a year of the onset of mining on that site in order to be sure that the information is as current as possible.

Yellow Warbler (*Dendroica petechia brewsteri*) and
Yellow-breasted Chat (*Icteria virens*)

The yellow warbler and yellow-breasted chat are California Department of Fish and Game "species of special concern" and were observed nesting in riparian habitat during the 1979 ARM Plan field studies. A more recent sighting of a yellow-breasted chat was recorded during field studies at the Piombo Pit area, adjacent to the South Levee reclamation site[23].

Both of these species nest in valley-foothill riparian habitat, the extent of which has been greatly reduced in the twentieth century. These species have declined in number, and are DFG species of special concern when located within suitable nesting habitat.

Table 4.7-2
Special Status Species and Natural Communities On, or in the Vicinity of, the Project Site

Scientific Name	Common Name	Status			Habitat	Habitat present on Site?	Species observed on site?
		Fed	State	CNPS			
Amphibians and Reptiles							
Rana boylei	Foothill yellow-legged frog	-	csc		Rocky streams within a variety of habitats	Yes	No
Rana aurora draytoni	Red-legged frog	C2	csc	-	Quiet pools of streams, marshes, occasionally ponds	Maybe	No
Clemmys marmorata	Northwestern pond turtle	C1	csc	-		Yes	No
Birds							
Ardea herodias	Great Blue Heron (Rookery)	-	csc	-	Riparian woodland, tall trees usually near water	Suitable habitat exists for future establishment	No rookeries observed during July 1991 survey
Casmerodias albus	Great Egret(Rookery)	-	csc	-	Riparian woodland, tall trees usually near water	Suitable habitat exists for future establishment	No rookeries observed during July 1991 survey
Dendroica petechia brewsteri	Yellow Warbler	-	csc	-	Riparian habitat during spring and summer	Likely resident	Observed nesting in vicinity of study area in 1979 survey.
Elanus caeruleus	Black-shouldered kite	-	csc	-	Groves of fairly dense trees used for nesting	Yes	Yes
Halieatus leucocephalus	Bald eagle	E	E	-	Large snags, trees, cliffs	Maybe	No
Icteria virens	Yellow-breasted Chat	-	csc	-	Riparian habitat during the spring and summer	Likely resident	Observed nesting in vicinity of study area.
Pandion haliaetus	Osprey	-	csc	-	Large snags, trees, cliffs, structures up to 1 mile from fish-producing water	Yes	Yes

Wading Bird Rookeries

The rookeries (communal nesting sites) of great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), snowy egret (*Egretta thula*), and black-crowned night heron (*Nycticorax*) are tracked by the CNDDB, because the number of rookeries has declined with the reduction of marsh and riparian woodland habitats throughout California. The Syar Industries study area contains tall trees suitable for rookeries in the riparian forest plant community; however, no rookeries were observed during three days of field surveys in July 1991.

At least one great blue heron rookery has been observed in the vicinity of the project site, near Windsor.[24,25] Additionally, great egret and snowy egret are listed among the bird species observed in the 1981 Aggregate Resources Management Plan for Sonoma County.[26] So, while there are no rookeries on site, the maintenance of existing older riparian habitat with tall trees (and the encouragement of regrowth of areas that are presently in an earlier stage of succession) is important if the decline in the number rookeries is to be arrested or reversed.

Black-shouldered Kite (*Elanus caeruleus*)

Black-shouldered kite is fully protected from unregulated take or possession by DFG due to the statewide decline in riparian woodland and forest habitats, which the black-shouldered kite uses for nesting. Tall trees within the valley-foothill riparian habitat of the study area provide suitable nesting habitat for this species; however, no black-shouldered kites or potential kite nests were observed during the 1991 summer field survey. Black-shouldered kites have been sighted over vineyards in the vicinity of the study area,[27] and it is possible that kites would use suitable nesting habitat within the project site in the future.

Osprey (*Pandion haliaetus*)

In 1975, the breeding population of this species in northern California was estimated to be between 350-400 pairs, with the numbers apparently increasing in recent years.[28] This primarily fish-eating hawk is a DFG species of special concern when it is located at a breeding site. Tall trees or snags (dead trees) within the project area would provide suitable nesting habitat for this species.

During the 1991 summer field survey, an osprey was noted roosting in a tall tree on the border between the Hopkins Agreement Area and the Benoist Pit within the Doyle site (Site 1). Near the southern end of the Benoist Pit, a stick nest, which could be an osprey nest, was noted. Ospreys were frequently observed flying overhead throughout the entire study area during this survey. It is likely that nesting occurs within the study area.

<u>Special Status Plant Species</u>

Special status plants are either listed as rare, threatened, or endangered by the state or federal government, are candidates for federal listing, or are species that would qualify for state listing based on the available evidence. Many of the plants on List 1B of the California Native Plant

Society's Inventory of Rare and Endangered Vascular Plants of California meet the criteria of the latter category.[29]

Although there are a relatively large number of special status plant species known from Sonoma County, the vast majority are known from vernal pools, freshwater marshes and bogs, coastal scrub, chaparral, and upland forest; habitats that are not common on the project site.

There is one species of grass, Sonoma alopecurus (*Alopecurus aequalis var. sonomensis*), that has the potential to exist within the project area. This grass is on the CNPS list 1B and is a Federal category 2 candidate for listing as threatened or endangered. Sonoma alopecurus is associated with riparian scrub habitat as well as marsh habitat.[30] This species was not observed during the comprehensive floristic survey conducted for the 1981 Aggregate Resources Management Plan. Changes to the species composition may have occurred over the ten year interim, so it can not be stated with certainty that the species is absent from the project site.

Other Species of Interest

Formica longipelosa

According to Dr. Phil Ward of the University of California at Davis, *Formica longipelosa* is a medium sized, silvery-gray ant for which there are only two recorded locations in the world. One location is just north of Hopland on the Russian River and the other is near Austin Creek State Park in Guerneville.[31]

According to Dr. Phil Ward, *Formica longipelosa* is a native species of ant that is pushed out in areas where they have to compete with the introduced (non-native) Argentine ant. The Argentine ant is established along much of the Russian River, but there may be pockets where it is not established and *Formica longipelosa* could occur.

This species is not included on any formal species of concern lists, but it is a native species of apparently very limited distribution and highly vulnerable; therefore, it is of particular interest. Although impacts on this species would most likely not be considered significant under CEQA, impacts could be extremely detrimental to the species.

City and County General Plan and Policies

Sonoma County General Plan goals and objectives that apply to this section of the EIR include the following:

5.1 CONSERVATION OF BIOTIC RESOURCES

Goal RC-5 Promote and maintain the County's diverse plant and animal communities and protect biotic resources from development activities.

Objective RC-5.1: Identify and encourage protection of areas with important wildlife habitats and woodland resources.

5.2 PROTECTION OF RARE AND ENDANGERED SPECIES

<u>Goal RC-6</u> Identify and protect rare and endangered species and their environment.

<u>Objective RC-6.1:</u> Identify the locations of rare and endangered plants and animals.

<u>Objective RC-6.2:</u> Require that any development on lands containing rare and endangered species be done in a manner which protects the resource or mitigates adverse impacts.

City of Healdsburg General policies that apply to the biological resources include the following:

E.1 The City shall make every effort to protect riparian vegetation. To this end, buildings and improvements shall be set back from watercourses according the following standards:

100 feet from the Russian River
35 feet from Foss Creek
25 feet from other streams and creeks

The setback shall be measured from the top of the existing bank or the top of the finished bank, where channel improvements are proposed.

The City may provide for variances to these standards in existing developed areas and other areas where the provision of such setbacks is not feasible. The areas within the setbacks shall be vegetated or revegetated, and maintained in riparian vegetation.

E.3 The City shall continue to implement and enforce its Heritage Tree Ordinance.

E.5 The City shall encourage the use of native plant species, such as oaks, in landscaping and in the replanting of cut slopes.

E.6 The City shall work with the Sonoma County Land Trust and any other non-profit conservation organizations and agencies in acquiring key open space and habitat areas where such an arrangement would benefit both the City and the property owner.

The Sonoma County code regulating surface mining and reclamation has the following standards relating to biological resources:

s)ii)5 Processing operations shall avoid streambank and riparian areas.

s)ix Disturbance or removal of vegetation above the ordinary high water mark shall not exceed the minimum necessary to provide access to the mining site along a road no wider than fifteen feet.

s)xii)2 Stockpiles [of sand and gravel] shall not be placed in areas supporting riparian vegetation or in areas set aside for riparian enhancement in an approved reclamation plan.

The Sonoma County Surface Mining and Reclamation Ordinance includes the following provisions[32]:

- All permanently exposed lands that have been denuded by mining operations shall be revegetated, except where technically infeasible. Revegetation methods shall be

appropriate for the topographical, soil, and climatic conditions present at the site and shall conform to the recommendations of the *Erosion and Sediment Control Handbook* (Amimoto, 1977) (Table 4.1-2).

- The natural regrowth or riparian vegetation shall generally be encouraged. Revegetation in or near riparian communities should be accomplished using plant species selected from the appropriate list of plants identified in *Aggregate Resources Management Plan* Program Environment Impact Report (1981), and *The Biotic Communities of Sonoma County*.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this EIR/EIS, an adverse impact on a biological resource will be considered significant if any of the following occur:

- The project diminishes a population of a rare or endangered plant or animal, or substantially diminishes or degrades its habitat. According to CEQA standards, a plant or animal is considered to be endangered if "its survival or reproduction in the wild are in immediate jeopardy," and considered to be rare if "...the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens." In addition to species that are officially listed by the state or federal government, or are candidates for federal listing, a plant or animal species is considered rare or endangered if there is data that indicates that this species meets the criteria for state listing (CEQA Section 15830). Plants that are on list 1A or list 1B of the California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (hereafter referred to as the CNPS Inventory) are considered by DFG to meet these criteria.

- The project substantially interferes with the movement of any resident or migratory fish or wildlife species.

- The project substantially diminishes or degrades habitat for wildlife or plants.

Method of Analysis

Potential direct impacts on the biological resources (other than fisheries, which are discussed in Section 4.6) of the Russian River corridor were analyzed through field surveys, discussions with persons knowledgeable about the biological resources of the Russian River, and research of the existing body of information about the biology of organisms in the project vicinity.

The potential cumulative effects of loss of riparian vegetation and habitat (both temporary and permanent), and the repeated disturbance to biotic resources in the proposed project area are analyzed in this section.

Project Impact

4.7-1 Mining and reclamation activities could result in the loss of riparian habitat.

Riparian corridors are an important and rapidly declining habitat. They provide essential breeding and foraging habitat for many birds and terrestrial species of wildlife. They also provide the necessary daily and seasonal migration corridors for many species. Removal of, or damage to, riparian habitat affects numerous common and special-status species. Historic losses of riparian habitat along the Russian River resulting from agriculture, mining, and urban development have magnified the value and importance of remaining riparian resources. Any net reduction of acreage of riparian habitat resulting from the alternatives would constitute a significant impact requiring mitigation.

A-1 The No Project Alternative would not result in the loss of riparian habitat. This is considered a ***less-than-significant impact***.

A-2 Alternative 2 would result in the disturbance or elimination of some riparian habitat in each reach of the river that is subject to access road construction, mining operations, and reclamation excavation. At the Doyle site, approximately 17.7 acres of early successional riparian herb-scrub would be eliminated as a result of pit development and reclamation activities adjacent to the river channel. Of the 17.7 acres of habitat, approximately 3.2 acres along the eastern bank of the low-flow river channel would be affected by the proposed stockpiling of top soil and other overburden materials in that area. The remaining acres would be affected, primarily, by expansion of the existing pit (approximately 20 acres) to 45 acres and associated mining and reclamation activities.

South Levee Haul Road skimming operations would affect approximately 12.8 acres of predominantly mid-successional willow-cottonwood woodland. An additional 0.3 acres would be affected by proposed improvements to the existing access road to the site.

The Middle Reach site contains a mixture of early successional riparian herb-scrub and mid-successional willow-cottonwood woodland. The herb-scrub associations are found primarily on previously disturbed areas on several of the gravel bars within this reach. The willow-cottonwood association is found adjacent to portions of the low-flow channel and on terrace areas to the west and east of the gravel bars. Proposed mining operations on the Middle Reach site would disturb a total of approximately 9.6 acres of riparian habitat. This is roughly evenly divided between early and mid-successional habitats. Proposed skimming operations on the four bars within the reach would affect primarily early-successional habitat, while proposed channel excavations, temporary channel construction, and haul road construction would cause greater disturbance to mid-successional habitats.

North Levee site skimming operations and haul road development would result in the disturbance of 1.9 acres total of early successional habitat. Of this total, 0.2 acres would be specifically affected by grading of the haul road.

Healdsburg Bendway skimming operations on Bar A (refer to Figure 3-15) and construction of haul road access for Bar C would result in the disturbance of 0.74 acres of early successional riparian habitat under Alternative 2. Due to the lack of vegetation on Bars C and B, skimming and channel excavation activities on those bars would not result in any loss of riparian habitat. Proposed construction of the five spurs on the Healdsburg Bendway site would result in the loss of an additional 0.2 to 0.6 acres of mid-succession willow-cottonwood habitat in areas along the north and west banks where the spurs would be joined to the bank. Additional disturbances to surrounding habitat would occur if strict controls of spur construction activities were not implemented.

The Riverbend site haul road construction would result in the disturbance of approximately 0.65 acres of early and mid-successional riparian habitat. Areas on the two gravel bars proposed for skimming under Alternative 2 are relatively void of established vegetation; habitat loss resulting from proposed skimming of these areas would be minimal.

Since most of the loss of riparian vegetation would be due to bar skimming, which would be repeated as the bars aggrade, the loss would be essentially permanent. This would have adverse ecological consequences for the long-term diversity and productivity of the riparian habitat associated with skimmed bars. These losses may be reduced through implementation of mitigation measures recommended below. The potentially permanent loss of riparian diversity and productivity, however, must be considered ***significant and unavoidable.***

A-3 Alternative 3 differs from Alternative 2, in that no channel excavation is proposed at the Middle Reach and Healdsburg Bendway sites under Alternative 3, and no spur construction is proposed at the Healdsburg site. Elimination of river channel excavation (and temporary channel construction) at the Middle Reach site would save approximately 0.7 acres of mid-successional habitat that would be lost under Alternative 2. Additionally, 0.2-0.6 acres of mid-successional habitat at the Healdsburg Bendway site would be retained under Alternative 3 that would otherwise be lost as a result of spur construction under Alternative 3. Any potential benefits to riparian habitat creation associated with sediment deposition and plant recruitment behind the spurs would not occur under Alternative 3. Aside from the above, all other impacts on riparian habitat anticipated under Alternative 3 are the same as Alternative 2 discussed above. These losses may be reduced through implementation of mitigation measures recommended below. The potentially permanent loss in riparian diversity and productivity, however, must be considered ***significant and unavoidable.***

A-4 Under Alternative 4, bar skimming would be allowed at the Middle Reach and South Levee sites only. No channel excavation is proposed as part of this alternative. Skimming at these sites would differ from that proposed under Alternatives 2 and 3, in that a 10-foot buffer zone along the low-flow channel would be created to protect stream side vegetation. Proposed mining and reclamation activities would also occur at the Doyle site under this alternative. Estimated riparian disturbance at the Doyle site under

Alternative 4 would be identical to Alternatives 2 and 3. Savings of less than one acre of riparian habitat would be achieved through imposition of the 10-foot buffer, but these savings would significantly enhance the diversity of the skimmed bar and channel, and enhance future recruitment of riparian species following mining activities. Riparian habitat losses associated with Alternative 4 may be reduced through implementation of mitigation measures recommended below. The potentially permanent loss in riparian diversity and productivity, however, must be considered ***significant and unavoidable***.

A-5 The Terrace Mining Alternative could result in the temporary loss of relatively large areas of riparian habitat. If the lower terrace were restored to equal or greater acreage of riparian forest, the long-term benefits would be great due to the development of a more natural stream channel and more natural succession of riparian habitat (after the initial restoration). Based on substantial long-term benefits to the riparian forest, this is considered a ***beneficial impact***.

Mitigation Measures

Implementation of the following mitigation measures would reduce the above impacts, but, for Alternatives 2 through 4, *not to a less-than-significant level.*

4.7-1(a) *Wherever possible, removal of, or damage to, riparian vegetation shall be avoided. This measure would be required for Alternatives 2 through 5.*

4.7-1(b) *A comprehensive revegetation plan shall be developed for implementation at the Doyle site. The plan shall be designed to include the following elements:*

1) the western and northern margins of the excavated pit shall be reclaimed as riparian forest, using methods that rely as much as possible on natural ecological processes;

2) the southeast margin of the pit shall be reclaimed to riparian habitat and, to the extent possible, a continuous vegetative corridor shall be established between mature riparian forest areas located southeast and north of the site;

3) in at least 5 percent of the finished pit, gravel shoals of 3 to 5 foot depth below the spring water level shall be developed to create aerobic environments in which the fish and invertebrate prey for diving birds will be produced;

4) a minimum of 5 percent of the margin of the pit shall be graded to nearly level grade to produce marsh and riparian forest habitat that will benefit dabbling ducks and marsh birds, as well as providing nursery habitat for fish;

5) *a monitoring plan shall be produced and shall determine whether natural succession at the site is proceeding normally and provide provisions to act if it is not.*

This measure applies to Alternatives 2 through 4.

4.7-1(c) *Stockpiles shall not be placed on areas supporting riparian vegetation.*

This measure would be required for Alternatives 2 through 4.

4.7-1(d) *Where established vegetation exists adjacent to the low-flow channel on gravel bars proposed for skimming, a ten-foot buffer zone extending from the edge of the low-flow channel shall be created to protect that vegetation.*

This measure would be required for Alternatives 2 through 4.

Project Impact

4.7-2 Mining and reclamation operations could result in the loss of one or more raptor nests.

Unregulated take of raptor nests is prohibited according to the California Fish and Game Code (Section 3503.5). Mining and road construction could result in the direct destruction of a raptor nest during the removal of riparian vegetation. Even if the nest were not physically disturbed, abandonment of a nest could result due to mining and reclamation activities in the vicinity. While surveys to date have not identified active raptor nests, raptors are likely to nest on the project site in the future.

A-1 This Alternative would not result in the loss of a raptor nest. Therefore, this is considered a ***less-than-significant impact.***

A-2 through A-5

All of these alternatives have the potential to result in the loss of an active raptor nest, because trees may be removed during excavation or road construction. This is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.7-2(a) *A qualified biologist shall conduct a raptor nest survey each season before road construction or mining commences (in areas that would result in the removal or disturbance of riparian forest) to determine whether any active nests have become*

established since the 1991 breeding season (when the surveys for this report were conducted). A copy of each survey should be submitted to DFG, USFWS, and the responsible permitting agency.

This measure would be required for Alternatives 2 through 5.

4.7-2(b) *If an active raptor nest is identified on site, appropriate mitigation measures shall be developed and implemented in consultation with DFG. It should be noted that DFG requirements are likely to vary for different species.*

This measure would be required for Alternatives 2 through 5.

4.7-2(c) *Until an appropriate level of protection and/or mitigation is approved by DFG, a 500-foot buffer shall be maintained between construction activity and the active raptor nest during the construction period.*

This measure would be required for Alternatives 2 through 5.

4.7-2(d) *Direct take of active raptor nests shall be avoided by conducting any necessary removal of mature trees containing stick nests between September 15 and February 15. This time period is outside of the breeding season.*

This measure would be required for Alternatives 2 through 5.

Project Impact

4.7-3 Mining and reclamation activities could result in the temporary and/or permanent loss of potential breeding habitat of the yellow-breasted chat and yellow warbler.

A-1 No loss of riparian habitat would occur under this alternative, so the impact is considered ***less than significant.***

A-2 through A-5

These two species nest in riparian habitat.[33] Disturbances to active nests resulting from mining or reclamation activities is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce this impact to a *less-than-significant level.*

4.7-3 *Any riparian habitat that will be disturbed or removed within one year, including habitat within 500 feet of mining or road construction activity, shall be surveyed prior to commencement of mining during the breeding season (April 15 to August*

15). Surveys shall be conducted by a qualified biologist using appropriate methodology. If breeding individuals of either species are found, suitable habitat shall be flagged and avoided. A buffer shall be established in consultation with DFG and USFWS. This measure would be required for Alternatives 2 through 5.

If it is not possible to avoid work outside the breeding season, this impact would be considered *significant and unavoidable.*

Project Impact

4.7-4 Mining and reclamation activities could result in the loss of individuals, or a population, of red-legged or foothill yellow-legged frogs and/or the northwestern pond turtle.

Although recent field surveys did not identify any of these species (see Table 4.7-2), the project area does contain suitable habitat. Mining and associated activities, like reclamation, could jeopardize individuals, or entire populations over a stretch proposed for mining. While adults are mobile enough to move out of an area being mined, eggs and tadpoles would likely be destroyed.

A-1 No loss of habitat, or direct loss of individuals, of red-legged or yellow-legged frogs, and/or the northwestern pond turtle, would result from implementation of this Alternative. This is considered a ***less-than-significant impact.***

A-2 through A-4

Implementation of these alternatives could affect habitat or individuals of these three species. The alternatives, because of the proposed potential for repeated skimming, would result in continuing impacts. The potential loss of habitat and individuals is considered a ***significant impact.***

A-5 The Streamway Alternative would not involve the disturbance of potential red- or yellow-legged frog habitat. Therefore, this impact is considered ***less than significant.***

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.7-4(a) *Any suitable habitat scheduled to be mined shall be surveyed during the appropriate season by a qualified biologist prior to and within one year of the commencement of mining activity. This measure would be required for Alternatives 2 through 4.*

4.7-4(b) *If any red-legged frogs, foothill yellow-legged frogs or northwestern pond turtles are found on the site of proposed mining activity, mining activity shall be conducted outside the time when eggs and tadpoles would be present (March-July). If mining were to occur (outside the breeding season) in an area where any of these three species occurred, the area shall be monitored to determine whether the species returned to the mined area. If the species did not return, a mitigation plan shall be developed, in consultation with DFG and USFWS, that may include restoration of habitat and reintroduction of the species. This measure would be required for Alternatives 2 through 4.*

Project Impact

4.7-5 Mining and reclamation operations could result in the loss of population(s) of rare plants; in particular, the Sonoma alopecurus (*Alopecurus aequalis* var. *sonomensis*).

Sonoma alopecurus is associated with riparian scrub and marsh habitat. Within the project area, some of the proposed access roads and areas to be mined include some riparian scrub habitat. There has not been a comprehensive floristic survey done of this area since the 1981 Aggregate Resources Management Plan, and the possibility remains that a population of this species may be present on site, and that individuals or a population of this species may be affected by road construction or excavation.

A-1 The No Project Alternative would not result in the loss of a population or individuals of Sonoma alopecurus, because mining and reclamation activities would not take place. This is considered a ***less-than-significant impact.***

A-2 through A-5

These alternatives could result in the loss of a population or individuals of Sonoma alopecurus. This is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.7-5(a) *Prior to any road construction or excavation in areas with riparian, especially riparian scrub, vegetation, the boundaries of the activity shall be clearly flagged and a qualified biologist shall survey the area for Sonoma alopecurus. This measure would be required for Alternatives 2 through 5.*

4.7-5(b) *If a population of Sonoma alopecurus is found, the population shall be durably fenced and avoided by relocating the road or excavation. If avoidance is not possible, a mitigation and monitoring plan shall be developed by a qualified*

biologist, subject to the approval by DFG and USFWS. This measure would be required for Alternatives 2 through 5.

Project Impact

4.7-6 A lowered groundwater table near the river banks below Healdsburg Dam and above the Healdsburg Bendway, caused by channel bed degradation, could decrease riparian vegetation regeneration and cover.

A-1, A-4 and A-5

These alternatives would not cause an increase in bed degradation and, therefore, would not cause a decline in the water table. This is considered a ***less-than-significant impact.***

A-2 and A-3

These alternatives could cause bed degradation below the Healdsburg Dam and above the Healdsburg Bendway, which in turn could lower the groundwater near the river channel banks. This could affect substantially the water availability for vegetation growing on the channel banks, and could reduce the success of riparian plant reproductive success. This is considered a ***potentially significant and unavoidable impact.***

Mitigation Measures

4.7-6 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.7-7 Bar skimming downstream of Healdsburg Dam could destroy topographic diversity and physical habitat for riparian vegetation and wildlife habitat.

A-1 and A-5

Bar skimming is not proposed for Alternatives 1 and 5; therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

The Proposed Project and Gravel Bar Skimming alternatives involve widespread bar skimming downstream of Healdsburg Dam, which would substantially change the topography of each bar by removing a large portion of the sediment and all of the vegetation cover. Bar skimming would change the diverse habitat conditions on the bars and the positive feedback of vegetation growth, sediment deposition during floods and further growth and succession of riparian vegetation. The skimmed bars would have a flat topography barren of vegetation. This is considered a ***significant impact.***

A-4 Alternative 4 would involve bar skimming, but on a fraction of the bar area encompassed by Alternatives 2 and 3. Therefore, the impact would occur over a limited area. Since most bars would be preserved and continue to evolve, there should be a net increase in diverse bar habitat relative to existing conditions. This is considered a ***less-than-significant impact.***

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact to a *less-than-significant level.*

4.7-7 *The area of permanent bar skimming shall be reduced, and portions of each bar shall be allowed to evolve diverse topography, riparian vegetation and habitat. This would be accomplished by implementing such measures as only skimming the downstream half of gravel bars and preserving vegetation adjacent to the waterline. This mitigation measure is required for Alternatives 2 and 3.*

Cumulative Impact

4.7-8 The potential loss of riparian habitat within the project area, when considered with cumulative development, would contribute to the regional loss of riparian habitat.

As discussed in Impact 4.7-1, above, the loss of riparian habitat along stretches of the Russian River corridor, in conjunction with the ongoing loss of riparian habitat in other areas of the Russian River and regionally, is an impact of local and regional significance.

A-1 This alternative would not add to the ongoing loss of riparian habitat on the Russian River or in the region. This is considered a ***less-than-significant impact.***

A-2 through A-4

These three alternatives would result in both the direct loss of existing riparian habitat, and the prevention of the succession of riparian habitats that develop on some gravel bars within rivers. If left, some bars begin to stabilize and vegetation begins to establish on them. Occasionally, floods scour a percentage of the bars and succession on those bars begins again. In this way, the river corridor has a variety of riparian community stages. Bar skimming would effectively maintain all the bars within the area to be mined in the early successional stages, preventing mature riparian forest from developing in the future. The direct loss of existing riparian habitat (both mid- and late-successional stages) and the loss of the bar substrate for the development of late successional stage riparian forest would be a ***significant and unavoidable impact.***

A-5 While this alternative would result in the loss of riparian forest initially, it would have long-term benefits through the development of a more natural stream channel and more

natural development of riparian habitat (after the initial restoration program). An initial direct loss of riparian habitat would occur as a result of this alternative but this would be offset by long-term gains in riparian acreage and other benefits. Because Alternative 5 would result in a more natural river channel and flood terrace, and will likely result in a long term net increase in the amount of riparian habitat along the Russian River, this would be considered a cumulative ***beneficial impact***.

Mitigation Measures

Implementation of the following mitigation measures would reduce this impact, ***but not to a less-than-significant level.***

4.7-8 *Implement Mitigation Measures 4.7-1(a) through (d) for Alternatives 2 through 4.*

Beneficial Impact

Floodplain "terrace" skimming in Alternative 5 would create topographic diversity in the channel, thereby providing opportunities for expansion of the riparian vegetation corridor and habitat for wildlife.

Construction of the spurs at the Healdsburg Bendway would expand low floodplain area for fine sediment deposition and growth of riparian vegetation. This would restore conditions that existed in 1945.

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4.8 LAND USE

4.8 LAND USE

INTRODUCTION

This section evaluates the consistency of the alternatives with existing County and City land use goals and policies. Areas of analysis include land use compatibility, loss of prime agricultural land, and conflicts with existing planning documents.

SETTING

Project Vicinity

The project area lies within a nine-mile stretch of the Russian River. Proposed mining operations would occur at six separate sites beginning at approximately river-mile (RM) 25, just north of Wohler Bridge and ending approximately at RM 34, east of Healdsburg. Historically, the project area has been extensively mined, dating back to the 1800's. In recent times, the area proposed for mining operations was under the ownership of Basalt Rock Company which maintained "vested rights" from 1984 to 1985. Vested rights allows the owner, by law, to proceed with mining operations without the acquisition of a permit from the County. Syar Industries acquired Basalt's lands and vested rights in February of 1986. As noted previously, vested rights do not exist for the Healdsburg Bendway site and do not apply to state and federal permit requirements.

Mining operations are not currently underway at the six project sites. Uses of the area are primarily recreational, including fishing and canoeing.

The predominant land use found adjacent to the project area is intensive agriculture, particularly in the areas outside of Healdsburg. Wine grapes and prunes are the major crops. Where the project site enters the City, surrounding land uses include residential to the north and mining and agriculture to the south. Some commercial and industrial uses lie to the west of the Healdsburg Bendway site, near RM 32. A county regional park is located downstream, just above Healdsburg Dam. Figure 4.8-1 shows existing general land uses.

Relevant Laws, Regulations, and Policies

Surface Mining and Reclamation Act (SMARA)

The purpose of SMARA is to identify and protect areas containing significant mineral resources. In doing so, SMARA (1) regulates surface mining operations to assure that adverse environmental

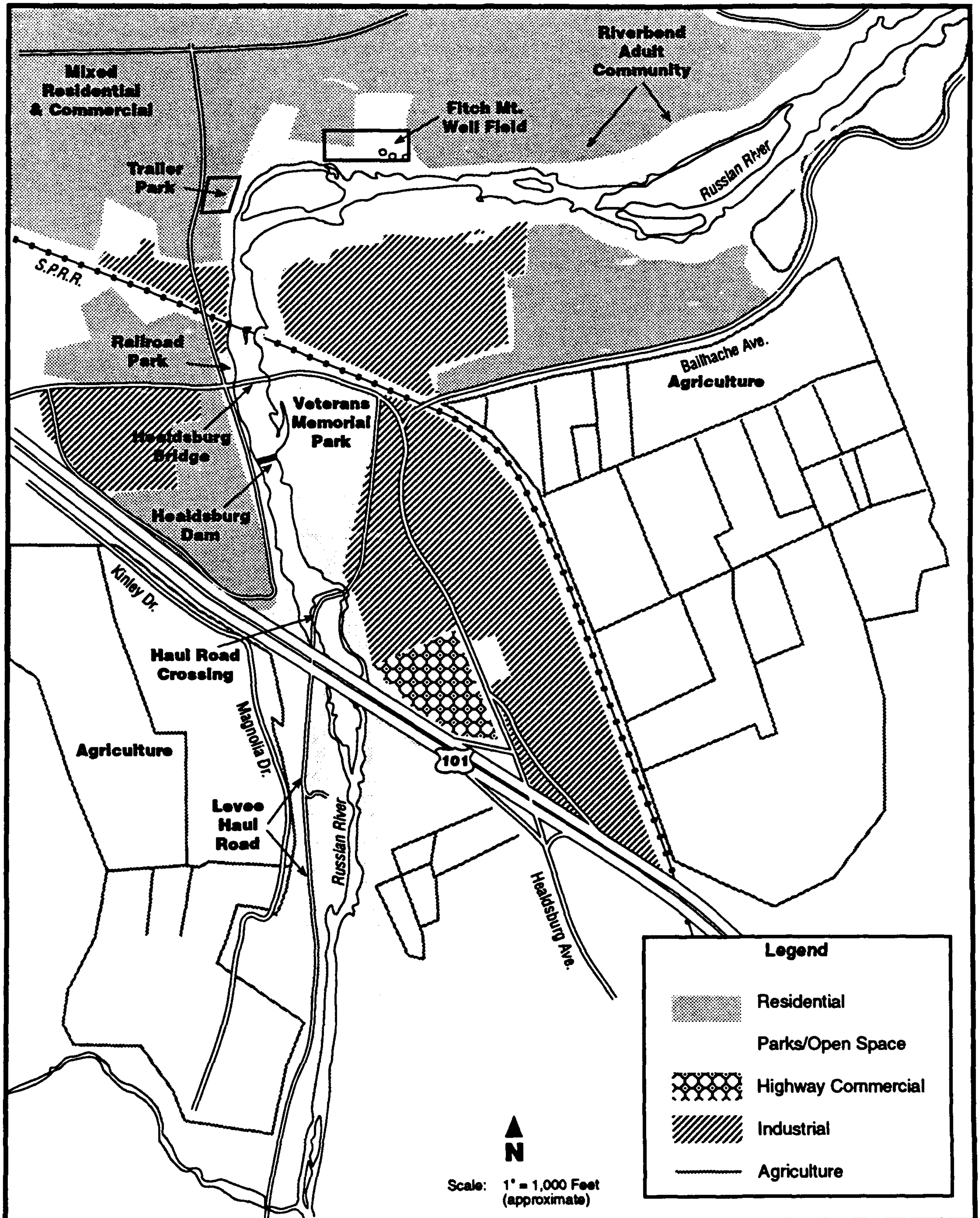

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Figure 4.8-1
Existing General Land Uses

effects are prevented or minimized; (2) requires reclamation of mined lands to a usable condition that is readily adaptable to alternative land uses; (3) produces and conserves minerals, and considers values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment; and (4) eliminates residual hazards to the public health and safety. Mining operators must comply with SMARA through the reclamation plan process.

State Lands Commission

The State of California acquired sovereign ownership of tidal and submerged lands and the beds of navigable rivers upon its admission to the United States in 1850. The State Lands Commission (SLC) administers the State's title to navigable rivers. The State claims title below the low water line on nontidally-influenced navigable waterways, and a public trust easement for commerce, navigation, and fisheries over the lands between the low and high water lines. The State's title includes surface and mineral estates. The public trust easement includes the right of the public to use waterways for boating, swimming, and other water-related uses and the preservation of environmental values. The SLC claims the Russian River is a navigable river at least to the City of Healdsburg, and that SLC jurisdiction extends to that point. The SLC's potential jurisdiction and sovereign claims may also extend upstream of Healdsburg. Aggregate mining on State-owned lands is not prohibited, but does require the formal discretionary approval of the SLC.

1980 Aggregate Resources Management Plan (ARM)

The 1980 ARM Plan currently serves as the regulatory document providing guidelines for sound management of aggregate mining in the County. An updated plan is due to be completed in the near future and is the subject of a separate EIR. The Draft EIR for the ARM Plan Update was released in July, 1992.

Policies that pertain to the proposed mining sites are listed below. A discussion follows each, providing a comparison of the proposed Reclamation Plans and alternatives to the ARM Plan.

<u>Reclamation Plan Policies</u>

All Operations

Reclamation shall commence and be completed at the earliest possible time.

The Reclamation Plans indicate that revegetation and reclamation would be done as soon as operations cease. For the Doyle site, reclamation would occur after all mining has been completed. At the other sites, access roads and in-channel mined areas would be revegetated anytime work was completed at the end of a season.

The public shall be guaranteed through appropriate bonding that approved Reclamation Plans shall be carried out.

None of the alternatives, including the proposed project, include provisions for bonding.

> The integrity of lands adjacent to mining operations shall be protected.

As proposed, most sites would eventually be reclaimed by planting natural vegetation. However, under Alternative 2, the Riverbend site would involve maintaining the excavated channel to protect adjacent property owners from potential streambank erosion. The Doyle site involves three reclamation alternatives: re-excavation, use as wetland habitat, or establish agriculture on the site. Alternatives 3 and 4 would preserve riparian vegetation and Alternative 5, in the long-term, would help restore the river to a more natural course. Other than the proposed reclamation concepts, the plans do not address the integrity of adjacent lands.

Instream Operations

> Compliance with the standards contained in the County Ordinance.

See page 4.8-8 for a discussion of County Mining and Reclamation Ordinance 3437.

Terrace Operations

> Reclamation to agricultural use shall be the first priority for terrace mining operations.
>
> Measures shall be taken to ensure that the agricultural capability of the reclaimed lands shall be consistent with such capability prior to extraction.
>
> The integrity of lands adjacent to mining operations shall be protected.
>
> Mined lands may be returned to an elevation below original grade but only for the specific purpose of reclaiming such lands to an alternative agricultural use, provided that erosion problems are minimized, adequate drainage is provided, and protection is afforded all agricultural lands from the hydrologic impacts of the river channel.
>
> Over the long term, the rate of reclamation to agricultural use should equal or approach the rate of extraction.

The Doyle site is the only terrace area that would be mined under Alternatives 2 through 4. After sufficient sediments have accumulated and refilled, one of three options for reclamation would be chosen. One of the proposed options involves reclaiming the site with agricultural uses. However, the project proponent stated the preferred alternative is use of the area as wetland habitat. Alternative 5 also proposes terrace mining of the lands immediately adjacent to the river, at the Middle Reach site. It should be noted that soils within these areas are not considered prime agricultural soils. Other than stating the area will be refilled with sediments, the plan under Alternative 2 does not state whether the site will return to its original grade. Alternative 5 proposed the creation of a "streamway" for reclamation, which would result in a grade possibly different from the existing grade.

Prime Agricultural Lands

Prime agricultural lands are defined by the Soil Conservation Service as those soils that exhibit the fewest limitations for agricultural production. Sonoma County contains approximately 525,000 acres of land in agricultural production, including both extensive (grazing, forage, crops) and intensive (vineyard, orchard, row crops)[1]. According to the ARM Plan, approximately 12,000 acres of prime soils (Class I and II) exist within the study area of the ARM Plan. Of this, 3,812 acres are located within the Dry Creek Valley area and 3,852 acres are within the "Middle Reach area" which encompasses the proposed project.

The effects of mining on agricultural lands can be detrimental to the viability of continuing agriculture. The proposed ARM Plan, however, concludes that limited in channel extraction could be done with minimal effect on farmland, whereas the terrace mining has more direct and severe effects[2].

The proposed inchannel mining sites are not located within areas of "prime" agricultural soils. However, the 45 acres of terrace that would be excavated under Alternative 5 is designated Prime Farmland. Also, there are prime soils adjacent to the sites, currently in agricultural use (see Appendix E for definition of important farmlands).

Williamson Contracts

Under the Williamson Act, the County is allowed to define areas of agricultural preserve, within which land owners can enter into a contract that preserves the land for agricultural use, recreational use, or open space. All contracts involving these preserves exclude uses other than agricultural or uses compatible with agriculture.

According to the County Planning Department, none of the proposed sites are under Williamson Act Contract. However, two of the proposed reclamation sites (Doyle and South Levee) are adjacent to parcels that are currently under contract.

Sonoma County General Plan

The Sonoma County General Plan divides the county into nine "sub-county planning regions". The project area falls within the "Healdsburg and Environs" planning region.

The project area is predominantly designated LIA (Land Intensive Agriculture), with some RRD (Resources and Rural Development) and DA (Diverse Agriculture) designations (see Figure 4.8-2). The LIA designation is intended to protect those lands most suited for permanent, high-yield agricultural uses. Uses in this area include vineyards, orchards and other intensive agricultural uses. Approximately 30,000 acres of LIA lands support vineyards. The RRD designation allows low density residential development and recreational and visitor uses. These uses are allowed when compatible with resource use, and when adequate public services are available. The DA designation applies to small, acreage-intensive farming and part-time farming and is intended to

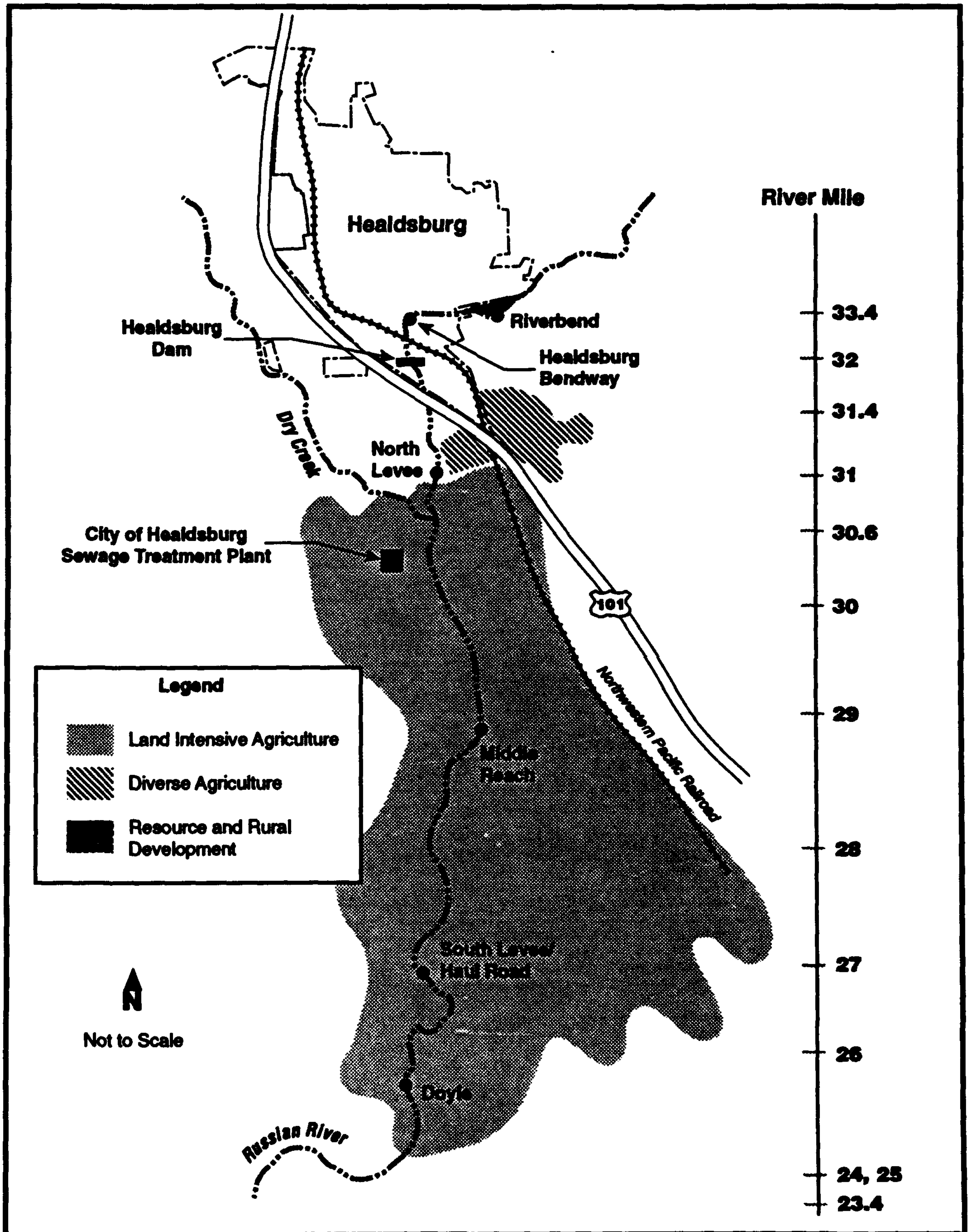

Figure 4.8-2
Sonoma County Land Use Designations

enhance and protect areas where soil, climate, and water conditions support such farming, practices.

Surface mining operations are considered permitted uses in these designations, consistent with the 1980 ARM Plan. Operations are subject to the requirements and standards of Chapter 26A of the County Code.

The following are County General Plan goals and policies that apply to the alternatives. Following each is a brief discussion comparing the proposed mining and reclamation plans and alternatives to the listed goals and policies.

Agriculture

Goal LU-8 Protect lands currently in agricultural production and lands with soils and other characteristics which make them potentially suitable for agricultural use. Retain large parcel sizes and avoid incompatible non-agricultural uses.

Objectives

LU-8.1 Avoid conversion of lands currently used for agricultural production to non-agricultural use.

LU-8.3 Agricultural lands not currently used for farming but which have soils or other characteristics which make them suitable for farming shall not be developed in a way that would preclude future agricultural use.

LU-8.4 Discourage uses in agricultural areas that are not compatible with long term agricultural production.

Under Alternatives 1 through 4, mining and reclamation would not occur on any agricultural land. Alternative 5 would result in the loss of 45 acres of farmland at the Middle Reach site.

Planning Area Policies - Healdsburg and Environs

Objective

LU-12.1 Manage terrace mining and instream mining of aggregates in the middle reach of the Russian River so that potential adverse impacts are minimized.

Policies

LU-12a Use the Aggregate Resources Management Plan to identify and designate sites for extraction of aggregate resources.

The ARM Plan is being updated to possibly include this information. The 1980 ARM Plan does not specifically identify potential sites. However, it does map the Middle Reach area of the river as predominantly "terrace reserves", with "instream reserves" within the riverway. Alternatives 2 through 4 propose instream mining within this area. Alternative 5 proposes terrace mining, and Alternative 1 does not propose mining.

Sonoma County Zoning Ordinance

The project area is currently zoned A1 (Primary Agricultural District) and A2 (Secondary Agricultural District). The purpose of the A1 District is "to preserve land best suited for permanent agricultural use from encroachment by incompatible uses".[3] The purpose of the A2 District is "to identify those lands suited for less intense agricultural uses or low density agricultural residential development".[4]

The County also has an MR (Mineral Resource) district. The intent of the MR district is to conserve and protect land capable of mineral resource production. This district is intended to be consistent with the designations of the ARM Plan and combined with base zoning of the General Plan's LIA, LEA, DA, and RRD land use designations. The MR uses supersede those allowed in the applicable base district.

Mining and Reclamation Ordinance 3437

The County of Sonoma adopted a Mining and Reclamation Ordinance pursuant to the provisions of the Surface Mining and Reclamation Act of 1975. The intent of the ordinance is to prevent adverse environmental effects on the environment; assure progressive reclamation concurrent with mining; assure mining is conducted in a manner consistent with mineral resource management policies; and encourage production and conservation of minerals essential to the economic well-being of the County.

As required by Ordinance 3437, vested rights operations are required to submit reclamation plans in accordance with Section 26A-7. The purpose of a reclamation plan is to ensure that environmental impacts are minimized, as required by SMARA. Each plan must detail how this objective is to be accomplished and each plan must be reviewed for approval by the Division of Mines and Geology. Currently, the Department of Conservation's Office of Governmental and Environmental Relations has stated that all six plans submitted by the project proponent are not in complete compliance with SMARA.[5] Table 4.8-1 displays the mandatory items that were not appropriately addressed by each plan. Items marked with an "X" indicate that the plan was not clear in addressing the item; the item needs supplemental information; and/or the item was not addressed at all.

In addition, the County requires all mining operations to furnish performance bonds. Section 26A-8, below, describes this requirement.

> SECTION 26A-8 PERFORMANCE BONDS
>
> a) <u>Bond</u>. All surface mining permits and reclamation plans shall require that the person responsible for reclaiming the mined lands furnish a performance bond, payable to the Board of Supervisors of Sonoma County, to insure timely and proper reclamation of mined areas. The performance bonds shall be coordinated with the reclamation plan and shall be in an amount sufficient to cover the estimated future costs of reclaiming and, if applicable, maintaining each newly commencing stage of the reclamation plan.

None of the alternatives address performance bonds.

TABLE 4.8-1
MANDATORY ITEMS FOR RECLAMATION PLAN COMPLIANCE WITH SMARA

Mandatory SMARA Items	Doyle	South Levee	Middle Reach	North Levee	Heidelberg Roadway	Riverbend
2729 Locations of Processing Facilities	--	--	--	--	x	--
2772 b Quantity of Mined Materials	--	x	x	x	--	x
2772 c Termination Date	--	x	x	x	--	x
2772 d Maximum Depth of Mining	x	x	--	x	--	x
2772 e Site Specific Map	x	x	x	x	x	x
2772 f Reclamation Time Schedule	x	x	x	x	x	x
2772 g Subsequent Uses	x	x	x	--	x	x
2772 h Description of Reclamation Treatments	--	x	x	x	x	x
2772 h1 Description of Mine Wastes Disposal	--	x	x	x	x	x
2772 h2 Minimize Erosion	--	x	x	x	x	x
2773 Site Specific Criteria	x	x	x	x	x	x
3502 b1 Description of Environmental Setting	x	x	x	x	x	x
3503 c Protection of Fish and Wildlife Habitat	x	x	--	x	--	--
3503 e Revegetation, Site Drainage	--	x	--	x	--	--
3503 f Resoiling Requirements	--	x	x	x	x	x
3503 g Revegetation Requirements	--	x	x	x	x	x

"x" - Reclamation plan submitted by Project Proponent is not in compliance with item.

"--" - Assumes plan is in conformance with item.

City of Healdsburg General Plan (1987)

According to the 1987 General Plan Policy document, the Healdsburg Bendway site is designated Heavy Industrial (HI). The HI designation provides,

> "...for industrial parks, warehouses, wineries, lumber mills, and manufacturing and industrial uses that may generate heavy truck and equipment traffic. Residential uses are prohibited. The maximum floor area ratio is .40."

The following goals and policies of the Healdsburg General Plan pertain to the proposed Healdsburg Bendway Mining and Reclamation Plan. Discussions comparing the proposed plans and alternatives to the General Plan follow each relevant policy.

> Section I
>
> Land Use
>
> Goal C: To provide for a pattern and intensity of land use that reflects historical patterns and at the same time respects natural constraints and conditions.
>
> Policy 6
>
> Development at the interface of different land use designations shall be designed to ensure compatibility between uses.

The proposed Healdsburg Bendway site is located within the City of Healdsburg and is therefore under the City's jurisdiction. Mining is a historical land use within the City.

> Section VII
>
> Natural Resources
>
> Goal C: To protect existing mineral extraction activities within the Urban Service Area.
>
> Policy 1
>
> The City shall provide through its regulatory powers for the continued use of properties along the Russian River for sand and gravel mining operations. Such operations shall be allowed to continue for the productive and economic life of the operation.
>
> Policy 3
>
> The City shall ensure that lands currently being mined for sand and gravel are reclaimed and rendered useful for another use upon the cessation of current mining activity.

Alternatives 2 and 3 would result in mining and reclamation at the Healdsburg Bendway site. No mining or reclamation at the Bendway site would occur under Alternatives 1, 4 or 5. The General Plan does not address the implications of spur construction, which is a component of Alternative 2.

City of Healdsburg Zoning

The City of Healdsburg Zoning Code designates the Healdsburg Bendway site as MG (General Industrial). The purposes of Industrial Districts includes:

a. To reserve appropriately located areas for industrial plants and related activities.

b. To protect areas appropriate for industrial use from intrusion by dwellings and other inharmonious uses.

c. To protect residential and commercial properties and to protect nuisance-free, non-hazardous industrial uses from noise, odor, insect nuisance, dust, dirt, smoke, vibration, heat and cold, glare, truck and rail traffic, and other objectionable influences, and from fire, explosion, noxious fumes, radiation, and other hazards incidental to certain industrial uses.

d. To provide sufficient open space around industrial structures to protect them from the hazard of fire and to minimize the impact of industrial plants on nearby residential and agricultural districts.

e. To minimize traffic congestion and to avoid the overloading of utilities by preventing the construction of buildings of excessive size in relation to the amount of land around them.

The MG district does allow the proposed mining operations with the acquisition of a use permit, subject to findings as set forth in Section 2105 of the Zoning Code, including

a. That the proposed location of the conditional use is in accord with the objectives of the zoning ordinance and the purposes of the district in which the site is located.

b. That the proposed location of the conditional use and the conditions under which it would be operated or maintained will not be detrimental to the public health, safety, or welfare, or materially injurious to properties or improvements in the vicinity.

c. That the proposed conditional use will comply with each of the applicable provisions of this ordinance.

City of Healdsburg Mining and Reclamation Ordinance 788

The City of Healdsburg Mining and Reclamation Ordinance would apply to the Healdsburg Bendway site. The ordinance seeks to ensure that:

a. Adverse environmental effects are prevented or minimized.

b. Residual hazards to the public health and safety are eliminated.

c. Mined lands are reclaimed to a usable condition which is readily adapted to alternative land uses.

d. The production and conservation of minerals are encouraged, while duly considering the values of watershed and flood protection, fish and wildlife, recreation and aesthetic enjoyment.

Section 3105 lists permit operations standards which are required in addition to the SMARA mining guidelines. The standards address public roads and streets, dust suppression, water quality, erosion, grading, groundwater protection, fish and wildlife protection, noise, and hours of operation. Each of these areas is discussed in the appropriate sections of this EIR.

In addition, Section 3108 would apply to the Healdsburg Bendway site addressing performance bonds.

> <u>3108 Performance Bond</u>
>
> Upon a finding by Planning Commission that a supplemental guarantee is necessary to ensure that the objectives of the reclamation plan will be attained, a surety bond, lien, or other security guarantee conditioned upon the faithful performance of the Reclamation Plan shall be filed with the Planning Commission. Such surety shall be executed in favor of the City of Healdsburg and reviewed and revised, ,as necessary, biannually. Such surety shall be maintained in an amount equal to the cost of completing the remaining reclamation of the site as prescribed in the approved or amended reclamation plan during the succeeding two-year period or other reasonable term.

The proposed plans and alternatives do not include provisions for performance bonding. These provisions would need to be provided to the City prior to project approval.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

According to Appendix G of the CEQA Guidelines, a significant land use impact would usually result if the proposed project would conflict with existing or approved uses or would be inconsistent with local adopted plans or ordinances. Although it does not specifically define standards of significance, NEPA regulations (40 CFR Section 1502.16(c) state that impacts to be evaluated include:

> possible conflicts between the proposed action and the objectives of Federal, regional, State, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.

Further, the NEPA regulations (40 CFR Section 1506.2(d)) describe one of the intents of NEPA:

> to better integrate environmental impact statements into State or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law.

For the purposes of this EIR/EIS, an impact is considered significant if one or more of the following apply:

- The project would not uphold the land use policies of the Sonoma County General Plan, City of Healdsburg General Plan or the ARM Plan;

- The project would convert prime agricultural land to non-agricultural uses or impair the agricultural productivity of prime agricultural land; or

- The project would result in conflicting land uses within the project area (such as a day care facility adjacent to a noisy industrial plant).

Method of Analysis

Existing land uses in the area were assessed by using aerial photographs and information from the County Planning Department, as well as field visits. The County also provided information on Williamson Act Contract lands within the project area.

The land use evaluation is based on a comparison of the existing and proposed uses on the site and their compatibility with adjacent land uses. The alternatives were compared to policies of the Sonoma County General Plan, Healdsburg General Plan and the Aggregate Resources Management Plan. The County's and City's mining ordinances are also addressed. The determination of the locations of Prime Farmland and other lands of agricultural significance were based on the 1990 Sonoma County Important Farmlands Inventory map prepared by the State Department of Conservation.

Project Impact

4.8-1 Mining and reclamation activities could result in noise, dust, and visual impacts creating nuisances for neighboring residences.

A-1 Under this alternative, mining is not proposed. Therefore, these measures would not occur, and this impact is considered ***less than significant***.

A-2 through A-5

These alternatives all involve mining activity. Each alternative varies in its operations, but each would result in noise, dust, and visual impacts. For a more detailed discussion of these impacts, please see Sections 4.9, Visual Quality, 4.13, Air Quality, and 4.14, Noise. As noted in Section 4.9, feasible mitigation does not exist for alteration of existing views. Therefore, this is considered a ***significant and unavoidable impact***.

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact *but not to a less-than-significant level.*

4.8-1 *Implement Mitigation Measures 4.14-5(a) and 4.14-5(b) to reduce noise impacts. This mitigation measure would be required for Alternatives 2 through 5.*

<u>Project Impact</u>

4.8-2 Aggregate extraction and reclamation, could occur on county lands currently zoned Primary Agricultural District and Secondary Agricultural District.

A-1 No mining or reclamation would occur under the No Project Alternative. Therefore, this is considered a ***less-than-significant impact***.

A-2 through A-4

These alternatives involve mining and reclamation activities in areas zoned for agricultural uses. Part of the mining permitting process typically includes an amendment to the zoning. However, since the project proponent maintains vested rights for the subject areas and no substantial change in operations is proposed, the proponent is not required to secure a permit as long as the vested right continue[6]. Therefore, this is considered a ***less-than-significant impact.***

A-5 Under this alternative, terrace mining is proposed in areas currently in agricultural use (A-1). Vested rights do not exist in this area. Therefore, the project proponent must secure a permit to mine which would require a zoning amendment to MR (Mineral Resources). As stated above, this is a typical part of a project. This is considered a ***significant impact.***

<u>Mitigation Measures</u>

Implementation of the following mitigation measures would reduce the above impact to a less-than-significant level. However, if the County Board of Supervisors do not change the zoning, Alternative 5 would be considered infeasible.

4.8-2 *The County shall make the necessary zoning amendments prior to issuance of a mining permit. This mitigation measure would be required for Alternative 5.*

<u>Project Impact</u>

4.8-3 Aggregate extraction and reclamation could occur on lands designated Land Intensive Agriculture and Resources and Rural Development by the Sonoma County General Plan.

A-1 through A-5

The proposed reclamation plans and alternatives involve mining within areas designated for agriculture and recreational/low density uses. However, the proposed uses have been existing land uses in the area for many years. Since proposed land uses are not different from what has historically occurred, this impact is considered ***less than significant.***

Mitigation Measure

4.8-3 *None required.*

Project Impact

4.8-4 Limitations set forth in the ARM Plan could be exceeded by proposed mining operations.

A-1 No mining or reclamation activities would occur under the No Project Alternative, so this is a ***less-than-significant impact.***

A-2 Under the existing ARM Plan, "skimming" gravel bars is the only form of instream gravel extraction allowed, and must be limited to no less than one foot above the annual average low-water level. This type of excavation must also take place between May 1st and October 30th. At five sites, the proposed mining and reclamation plans involve excavation below the set limit. However, since the ARM Plan was adopted in 1980, it fails to address the project proponent's vested rights which were established in 1984 and 1985. As a result, under SMARA, the vested rights operations would supersede the requirements of the ARM Plan. As the single nonvested site occurs within the City of Healdsburg, this also is not subject to the requirements of the 1980 ARM Plan. Therefore, this is considered a ***less-than-significant impact.***

A-3 Alternative 3 proposes gravel bar excavation in accordance with the 1980 ARM Plan. Therefore, this is considered a ***less-than-significant impact.***

A-4 Under this alternative, bar skimming would be more limited than under the 1980 ARM Plan standards. Therefore, this is considered a ***less-than-significant impact.***

A-5 Under the Streamway Alternative, terrace mining would likely occur in areas designated for the management of agricultural resources. The alternative would be inconsistent with the ARM Plan, so this would constitute a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.* Sonoma County is currently updating the ARM Plan. If the Board of Supervisors does not choose to amend the ARM Plan to allow terrace mining at the Middle Reach, Alternative 5 would be considered infeasible.

4.8-4 *The County shall update the ARM Plan to allow proposed terrace mining at the Middle Reach site. This measure would be required for Alternative 5.*

Project Impact

4.8-5 Proposed mining and reclamation operations may require State Lands Commission permitting.

A-1 Under the No Project Alternative, proposed gravel extraction operations from the Russian River channel and low terraces would not occur. Therefore, this alternative would not result in the need to acquire SLC permits. This is considered a ***less-than-significant impact.***

A-2 The SLC contends that the State of California holds title to lands beneath the stream channel and therefore has jurisdictional authority over its use. As such, the proposed project may be required to obtain a permit, lease or entitlement from the SLC prior to the commencement of gravel operations. This position is being contested by the project proponent, which claims that its vested rights to resources at five of the proposed sites would allow mining without obtaining such a permit. It is also unclear whether a SLC permit is required for the Healdsburg Bendway site. Currently, this dispute is in litigation. This is considered a potentially ***significant impact.***

A-3 and A-4

These alternatives would involve instream excavation, but only of selected gravel bars identified in the proposed vested rights reclamation plans. Excavation would be eliminated in the low flow channel. If the court finds that the SLC has jurisdiction, it would be expected the SLC would require permitting under this alternative. This is a potentially ***significant impact.***

A-5 This alternative would conduct terrace mining operations immediately adjacent to the river. Since no mining would take place instream, lands potentially under the jurisdiction of the SLC would not be affected. This is considered a ***less-than-significant impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.8-5 *Should the SLC have jurisdiction over the channel of the Russian River, the project proponent shall obtain the necessary permits, leases or entitlements from the SLC. This mitigation measure would be required for Alternatives 2 through 4.*

Once the jurisdictional dispute has been settled, and should the SLC have authority over the use of the river, the project proponent would need to acquire the necessary permits, leases or entitlements from the SLC.

Project Impact

4.8-6 Reclamation of the Doyle site to agricultural uses may not be successful.

A-1 and A-5

Under these alternatives, mining and reclamation of the Doyle site would not occur. The area would be allowed to return to a natural state. Since the Doyle site has not been previously classified as land capable of agricultural production, this is considered a ***less-than-significant impact.***

A-2 through A-4

Proposed reclamation of the Doyle site involves three alternatives, one of which would reclaim the site for agricultural uses. According to the Draft EIR on the ARM Plan Update, reclaiming land for vineyards is generally infeasible because of the very large amount of fill required after gravel is removed. Unless a feasible method of reclamation for agriculture is available, reclamation of the Doyle site is unlikely to comply with the policies regarding agriculture in the 1986 ARM Plan for terrace operations. However, these policies pertain to lands that have been previously classified as lands capable of agricultural production. The soils of the Doyle site have not been classified as agricultural. Therefore, this is a ***less-than-significant impact.***

Mitigation Measure

4.8-6 *None required.*

Project Impact

4.8-7 Prime farmland may be lost due to mining and reclamation activities.

A-1 through A-4

Under these alternatives, mining is proposed to take place within the channel and at the Doyle site. According to the Department of Conservation, there are no soils within the Russian River streamway that are classified as important farmlands. Therefore, important farmlands would not be converted. The Draft ARM Plan states "limited in channel extraction...can occur with a minimal effect on the County's available farmland."[7] This is considered a ***less-than-significant impact.***

A-5 Proposed mining under Alternative 5 would result in the loss of Prime Farmland. As shown on Figure 4.8-2, Prime Farmland is present on both sides of the river. Proposed terrace mining under this Alternative would convert approximately 44 acres of Prime Farmland.

The Draft ARM Plan states that terrace mining has a "more direct and severe" effect on farmland than instream operations.[8] Reclamation of the site back to agricultural uses is likely infeasible due to the large amounts of fill required after gravel is extracted. Since the Middle Reach site may be more suited for non-agricultural reclamation, such as for recreation and open space uses, this is considered a ***significant and unavoidable impact.***

Mitigation Measure

4.8-7 *None available.*

Cumulative Impacts

4.8-8 Regional reductions in usable Prime Farmland would be exacerbated.

A-1 through A-4

Under these alternatives, mining is proposed to take place within the streamway. According to the Department of Conservation, there are no soils within the Russian River Streamway that are classified as important farmlands. Therefore, important farmlands would not be converted. This is considered a ***less-than-significant impact.***

A-5 Mining under this alternative involves the conversion of approximately 44 acres of Prime Farmland, contributing to the County's regional loss of important farmlands. This is considered a ***significant and unavoidable impact.***

Mitigation Measure

4.8-8 *None available.*

ENDNOTES

1. Sonoma County, *Aggregate Resources Management Plan,* 1980.
2. Sonoma County Planning Department, *Draft Sonoma County Aggregate Resources Management Plan and Environmental Impact Report,* July 1992.
3. Sonoma County, Ordinance No. 1928.
4. Ibid.
5. Luree Stetson, Assistant Director, Office of Governmental and Environmental Relations, Department of Conservation, Written Communication, December 20, 1991.
6. Sonoma County, Ordinance 3437, Section 26A-3.
7. Sonoma County, 1992, Op cit.
8. Ibid.

4.9 VISUAL QUALITY

4.9 VISUAL QUALITY

INTRODUCTION

This section addresses visual quality and aesthetics issues related to implementation of the alternatives. Existing visual characteristics of the project site and vicinity are documented. Standards used to judge visual sensitivity are presented, and relevant scenic resource issues are addressed. The evaluation examines potential effects of the proposed reclamation plans on visual quality and aesthetics in the area.

SETTING

Project Vicinity

The project site lies in an area known generally as the Middle Reach (not to be confused with Site 3, the Middle Reach Site, of the project) of the Russian River, near the City of Healdsburg. Within the project vicinity, land uses consist primarily of agriculture, including vineyards and orchards, with the exception of the City of Healdsburg and some rural residential areas.

The river and the agricultural uses provide the area with a distinctive rural ambience and aesthetic quality. The stream channel meanders through gravel bars and riparian woodlands on the valley floor, surrounded by vineyards and orchards, with hillsides sloping upwards in the background to the east and west. These views in the project vicinity afford a visually enjoyable sight to both travelers and residents of the area. Much of this scenery is viewed from the Russian River by recreational enthusiasts, as the Russian River is used extensively for canoeing, fishing, and swimming. The Critical Open Space Map of the Sonoma County General Plan identifies both the Dry Creek corridor, which lies adjacent to a portion of the project site, and the Russian River corridor as Unique Features.

In addition to the river corridors, the hills to the east of the valley and Westside Road paralleling the western edge of the valley are considered to be of particular visual importance. Westside Road is identified as a Scenic Corridor in the Sonoma County General Plan. Within the City of Healdsburg, Highway 101 is designated a scenic highway.

Topography in the project vicinity consists mainly of slopes of less than 5 percent; however, slopes in excess of 30 percent occur in the upland terrain along the ridges bordering the valleys to the north and west of the Middle Reach. Slopes of the low-lying ridges east of Eastside Road

and north of Healdsburg and those of the lower foothills along the edges of the valley floors generally range from 5 percent to 30 percent.

Project Location

The project area consists of six separate sites along a nine mile reach of the Russian River in Sonoma County. These sites are situated roughly between the cities of Guerneville and Healdsburg, extending slightly east of central Healdsburg in an area characterized primarily by agricultural uses. The sites are located in a relatively flat area. Beyond the river, the valley rises gradually into rolling hills to the west, and somewhat more steeply north and east of the project area. Figures 4.9-1 through 4.9-4 present photographic images of several of the project sites.

Adjacent areas, with the exception of the City of Healdsburg north and northeast of the site, are presently in agricultural use. Scattered residences are situated within these outlying agricultural areas, and above Healdsburg on the hills to the northeast. The aerial photograph (in the map pocket at the back of this DEIR) depicts existing visual features of the project vicinity.

Views in the vicinity of the Doyle site, South Levee Haul Road and Middle Reach are characterized by riparian vegetation and gravel bars along portions of the river, and agricultural uses and broad panoramas in the foreground, with hills providing the eastern and western backgrounds. The expansive views of agricultural land in the middle ground are fragmented by the frequent clusters of trees that surround homes and outbuildings in those areas.

The North Levee, Healdsburg Bendway and Riverbend sites are located in and adjacent to the more urban Healdsburg area. Much of the river is visible from parts of Highway 101, the Healdsburg Bridge, parks, roadways and private residential yards. Views in this area consist primarily of riparian vegetation and gravel bars in the foreground, with residential and other urban uses in the middle ground. Again, the background is clearly defined by the hills which rise nearby, scattered with residences.

From the river itself, the primary characteristics visible in the adjacent area consist of the riverbanks and levees, and some surrounding agricultural open spaces, particularly vineyards interspersed with clusters of trees where vegetation along the banks is sparse. Most of the site lies at an elevation below that of the surrounding area; consequently, short-range views of the riverbanks and levees, and long-range views of the higher surrounding hillsides are attainable from much of the river, with very little visible in the middle distance.

History

Historically, mining of river materials in Sonoma County has taken place in the Middle Reach of the Russian River since the middle 1800s. A levee road was constructed along the western bank of the river and across Dry Creek to facilitate access. The levee also made land that had been part of the stream channel and its banks available for farming. Orchard and vineyard crops flourished, contributing to the present character of the area surrounding the Russian River.

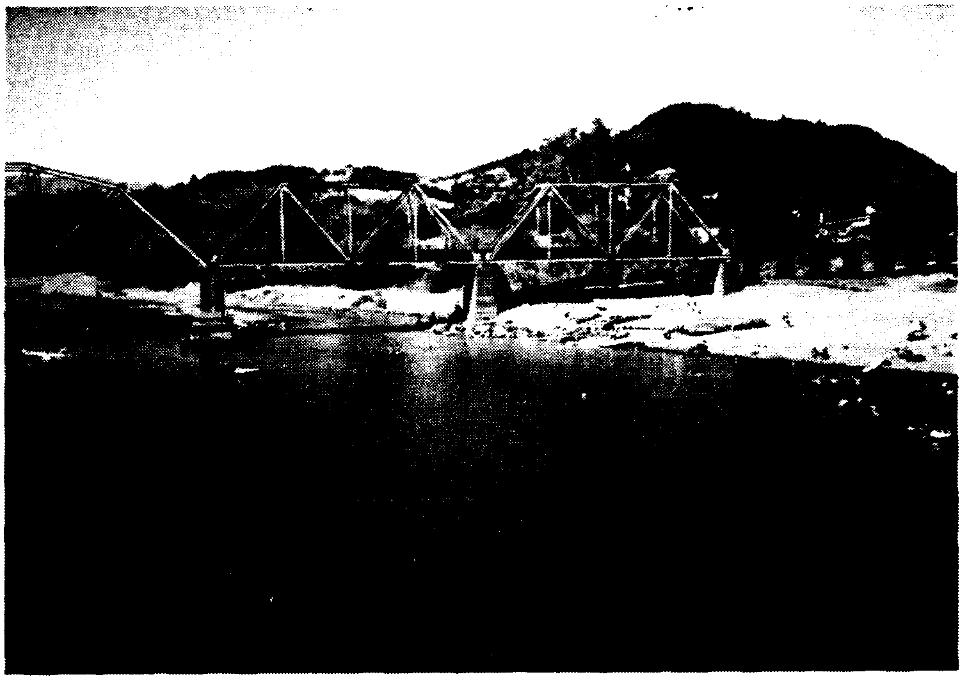

Figure 4.9-1 View North from Healdsburg Avenue Bridge

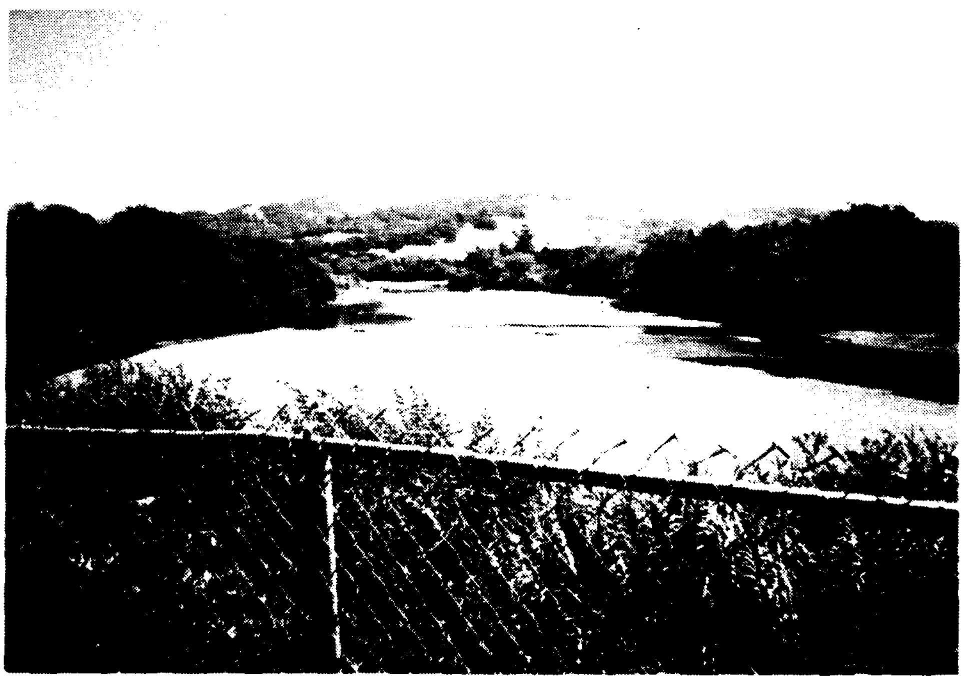

Figure 4.9-2 View of Healdsburg Bendway and River Bend Sites (from Trailer Park)

SOURCE: EIP Associates, 1993.

Figure 4.9-3 Bluff at Healdsburg Bendway

Figure 4.9-4 Pond at Doyle Site

SOURCE: EIP Associates, 1993.

During the 1960s, mining in the Middle Reach shifted from instream mining operations to the alluvial terraces immediately adjacent to the streambed. Since that time, such terrace operations have been the predominant mining method in the Middle Reach, and the bulk of aggregates mined in the Middle Reach is retrieved from terrace deposits.

Over the course of many decades, these operations have altered both the river channel and the visual character of the project vicinity, resulting in the area's present appearance.

Visual Sensitivity

Local land uses considered most sensitive to implementation of the project include scenic view corridors, scenic highways, local residences and recreational uses. Scenic corridors and highways are considered a sensitive land use not only because large numbers of motorists travel these routes, but because federal, state, and local agencies have, through extensive analysis, identified them as areas of exceptional scenic quality and attempted to preserve the scenic resources that first prompted the designation. Local residents are considered sensitive because of the duration of their exposure to any change, their familiarity with the existing landscape, and their ability to detect a change. Scenic quality is generally considered an important factor for recreational users enjoying recreational activities, including bicycling, hiking, picnicking and water sports, such as boating, swimming and fishing. Similarly, scenic quality is considered to be of moderate importance to nearby businesses and tourist destinations. Although the perceptions of users in these categories are important, their exposure to the landscape is considered to be of short duration and secondary to the primary purpose of their presence.

The attitudes of people using area parks, such as Veterans' Memorial Beach and the Russian River, and residents of surrounding areas are assumed to be of high concern for scenic quality. The attitude of visitors to Healdsburg and travelers on surrounding roadways, with the exception of those roadways considered scenic, is assumed to be of lower concern because the project site is seen as part of the general surroundings, and is not highly visible from many of these areas. Along designated scenic roadways with views of the river, parks and other points of access, scenic quality is an important concern.

The greatest number of people viewing the river and its environs are in the Healdsburg area, since south of Highway 101 there are few homes and little direct public access to the river. A brief glimpse of the river is visible from the 101 bridge, but it is minimized by the bridge's walls and driving speeds. On the west side of the river, between the Healdsburg Dam and the Memorial Bridge, there is a residential neighborhood. Very little of the river can be seen from its homes. However, on the east side, between the dam and the bridge, is the County's Healdsburg Veterans' Memorial Park. This park includes beach front and, from Memorial Day through Labor Day, flashboards are placed in the dam, creating a deep backwater and swimming area. From the beach and the swimming area, the river is visible to the Highway 101 bridge and just below the Healdsburg Bendway (see Figure 4.9-5). When the flashboards are not installed, the river drops approximately 8-10 feet and the concrete base of the dam is visible, along with the steel I-beams that support the flashboards. Most of the gravel bars that would be mined are visible only at low flows (when the flashboards are down).

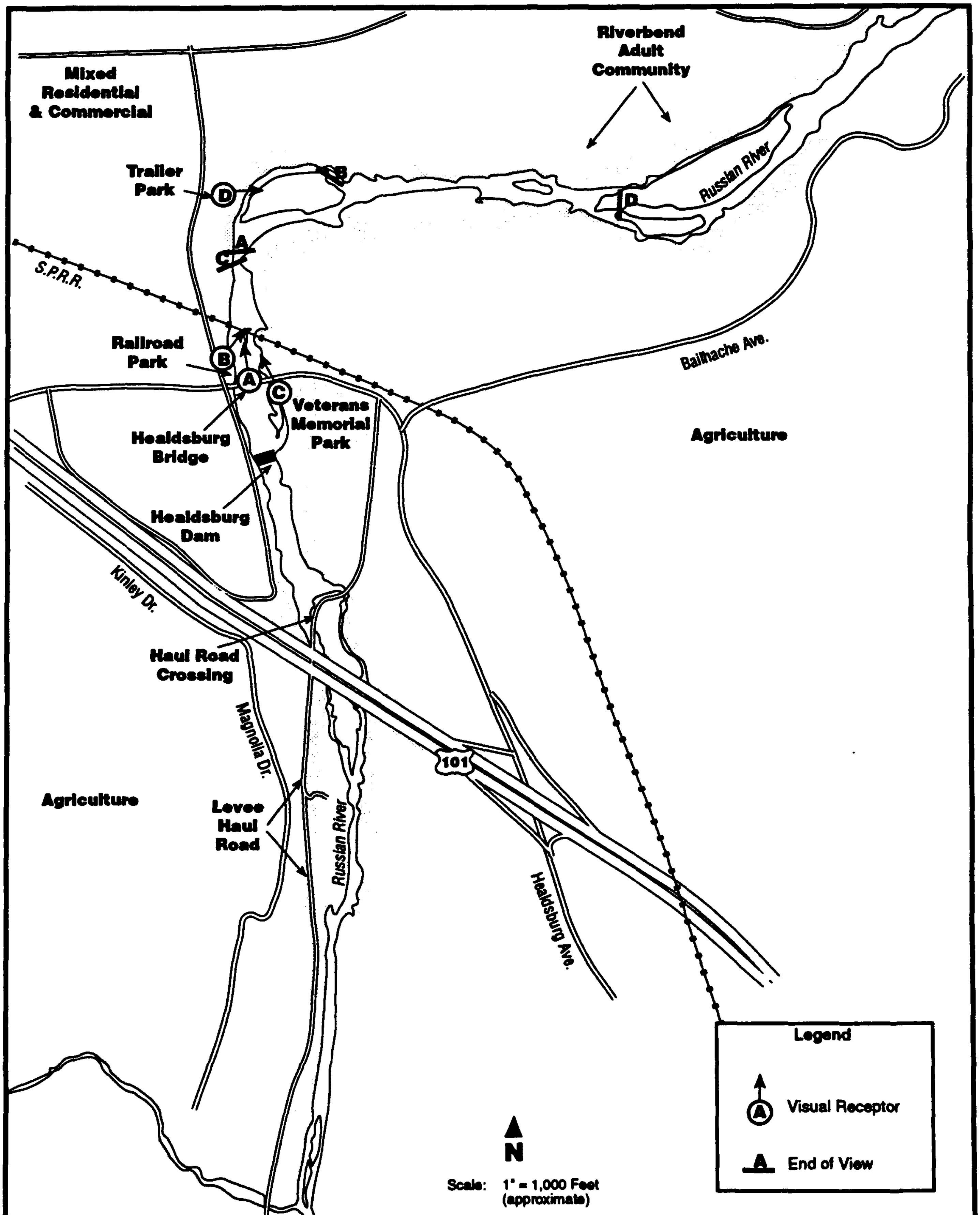

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Figure 4.9-5
Views in Healdsburg Area

From the Memorial Bridge, one can see as far as the lower end of the Healdsburg Bendway site, although the railroad bridge blocks much of the view. Between the Healdsburg Bridge and the railroad bridge there lies a small park with an approximately 200-foot strip of grass along a stone wall that forms the riverbank. Several benches face the river, which is separated from the park by the stone bank and a cyclone fence. The two bridges and the river dominate views from the park. Looking north from the park, one can see as far as the eastern side of Bar B at the Healdsburg Bendway (see Figure 4.9-5).

At First and Mason streets, there is a trailer park, which extends to the river bluff. The bluff is approximately 20 feet high when the dam is in place, and is covered with dense vegetation. From two or more trailers and a communal area, one has an unobstructed view of the river up to approximately Bar B of the Riverbend site. Some of the taller elements of the Syar processing plant are visible from the trailer park as well.

On the north side of the river, there are residential developments near the eastern edge of the Healdsburg Bendway site and along the entire Riverbend site. These residential developments are within the city limits. Most houses in these areas are set back from the river and have trees and shrubs blocking any view of the river. However, the development near the Bendway site has access to the river from a private community path (although trees and shrubs block the view of the river from the path itself). At least one house in the River's Bend Adult Community has a view of the Riverbend site. In addition, the River's Bend development has community areas and path with river views and paths to the river's edge.

On the south side of the Riverbend site, there are some homes with views of the river, access via a private drive and vineyards. These areas are in the county.

There do not appear to be any homes above the Riverbend site that would have a view of the Riverbend or Healdsburg bendway sites.

The effects of the alternatives on visual receptors are discussed in the Impacts and Mitigation Measures section.

City and County General Plan and Policies

Relevant goals and policies related to scenic resources are found in the Sonoma County General Plan and the City of Healdsburg General Plan. Applicable goals and policies from these documents are listed below. The relationship between these policies and the proposed project is discussed in greater detail in the Impacts and Mitigation Measures portion of this section.

Sonoma County General Plan

The Sonoma County General Plan designates areas east and west of the project site as Scenic Landscape Units, specifically westward into the Dry Creek Valley and east of the project site along Eastside Road. In addition, the Sonoma County General Plan designates the Russian River corridor as a Scenic Corridor. None of the Scenic Corridor goals, objectives or policies apply

directly to the Russian River corridor, but are intended for use with scenic highway corridors instead. The Sonoma County General Plan contains the following applicable goals and policies:

2.2 POLICY FOR SCENIC LANDSCAPE UNITS

Goal OS-2

Retain the largely open, scenic character of important scenic landscape units.

Objective OS-2.1

Retain a rural, scenic character in scenic landscape units with very low intensities of development. Avoid their inclusion within spheres of influence for public service providers.

Policy OS-2b

Avoid commercial or industrial uses in scenic landscape units other than those which are permitted by the agricultural or resource land use categories.

City of Healdsburg General Plan

The City of Healdsburg General Plan contains the following applicable Scenic Resources and Urban Design goals and policies:

SECTION IV. SCENIC RESOURCES AND URBAN DESIGN

Goal A: To preserve and enhance Healdsburg's small-town character and the experience of its natural setting.

Policies:

2. The City shall encourage the County to retain surrounding lands in very low-density residential, agricultural, and natural resource uses that provide contrast to urbanized Healdsburg.

3. The City strongly encourages the maintenance of maximum summer flows in the Russian River to protect water quality and the recreational values of the Russian River.

5. Protection of distinctive natural vegetation such as oak woodlands, riparian corridors, and mixed evergreen forest shall be encouraged.

6. The viewshed along scenic highways, roads, and streets shall be protected and enhanced. The following road segments are declared scenic roads for the purposes of the Healdsburg General Plan and City land use regulations.

    - Highway 101 - Entire length within the Planning Area
    - Dry Creek Road - West of Highway 101
    - Westside Road/West Dry Creek Road - Entire length within the Planning Area

- Healdsburg Avenue - South of Memorial Bridge

Appendix B of the City General Plan further defines goals for enhancing the commercial/industrial appearance of the southern entrance to the City. These are identified under Urban Design District 8. Although none of the project area falls within a design district, District 8 is immediately southeast of the Bendway site, and includes all of the Healdsburg Avenue, Old Redwood Highway area designated for heavy industrial and highway commercial uses. A key issue for this area will be establishing a major gateway entrance to Healdsburg.

Urban Design measures are also listed in Appendix B of the City's General Plan. Applicable measures include:

A. Architectural Controls

   4. Screen industrial development
      - Require the use of extensive landscape screening

E. Specific Design Controls

   1. Provide City/Downtown entry/portal treatment
      - Make gateways distinctive and memorable; highly imaginable.

The relationship of the alternatives to these goals and policies is discussed in the Impacts and Mitigation Measures portion of this section.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this analysis, impacts are considered significant if one or more of the following conditions would result from implementation of the proposed project:

- A substantial, demonstrable negative aesthetic effect;
- Compromised preservation of views and sunlight;
- Alteration to the existing character of the site; or
- Production of light and glare which may disturb activities in adjacent areas.

Method of Analysis

Visual impacts are generally subjective, as sensitivity to change in the visual environment varies and individuals respond differently to these changes. For this reason, this analysis can only address the visual impacts of the proposed reclamation plan and alternatives on a qualitative level, based on the textual and graphic descriptions provided.

Potential impacts of implementation of the proposed project and alternatives on sensitive receptors and the areas surrounding the sites were assessed in relationship to the following issues:

- Views;
- Scenic quality; and
- Potential light and glare.

In addition, impacts of the project on visual quality were determined by analyzing the relationship between the general visual characteristics associated with implementation of the proposed alternative and the characteristics of existing land uses in the vicinity.

Project Impact

4.9-1 Implementation of some of the alternatives would create a negative aesthetic experience for sensitive receptors in and near the City of Healdsburg.

A-1 Under the No Project Alternative, there would not be any equipment or mining operations in the river near Healdsburg. The river would return to a more natural state. This is considered a ***less-than-significant impact***.

A-2 and A-3

Under these alternatives, mining operations, including the use of equipment in the river and stream-crossings, would occur at the Healdsburg Bendway and/or Riverbend sites for two months in four out of five seasons. This would result in periodic, short-term, negative visual effects to those living in or visiting Healdsburg. Mining equipment will generally consist of large, mobile vehicles, such as trucks and front loaders. During operations, one or more heavy vehicles will be onsite, at any one time, with haul trucks moving between the site and the processing plant. Water trucks will be used for dust control on haul roads. The reclamation plan indicates that reclamation would return the river to a more sinuous and "natural" state, but does not indicate when this would occur. When the Healdsburg site is being mined, operations could be visible from the Veterans' Memorial Park, the railroad park, several residences and at river access points. Riverbend activities will be visible from private community paths and one or more residences. There is no feasible way to screen the mining operations from the bluffs and the river, so this is considered a short-term, ***significant and unavoidable impact***.

A-4 and A-5

The limited bar skimming and streamway alternatives would occur in an area that is not visible to residents or visitors of Healdsburg; therefore, this is considered a ***less-than-significant impact***.

Mitigation Measures

4.9-1 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.9-2 Some of the alternatives would result in negative visual effects for sensitive receptors in rural areas.

A-1 Since no mining would occur under the No Project Alternative, the impact is considered ***less than significant.***

A-2 through A-5

Most of the mining operations that would occur under these alternatives would not be visible to residents in the vicinity. However, activities at the North Levee site would be visible from automobiles on the Highway 101 bridge and possibly from the Veterans' Memorial Park. Both river and terrace mining would be easily seen from the river by people boating, hiking, fishing or birdwatching, and would occur when the river is most heavily used. Therefore, this is considered a short-term, ***significant and unavoidable impact.***

Mitigation Measures

4.9-2 *None required for Alternative 1. None available for Alternatives 2 through 5.*

Project Impact

4.9-3 Implementation of any of the alternatives would generally support Sonoma County goals and policies related to scenic resources.

A-1 through A-5

Development of any of the alternatives would comply with the applicable goals and policies of the Sonoma County General Plan. Specifically, the alternatives would assist in the retention of the open scenic character of the county, while maintaining permitted resource land uses in the project area. In addition, the reclamation plans emphasize the protection of the natural vegetation visible along the river, and the viewshed along nearby scenic roadways. Very little of the project site would be visible from scenic roadways, with the exception of the portion perceivable from the segment of Highway 101 where it crosses the Russian River. This is considered a ***less-than-significant impact.***

Mitigation Measures

4.9-3 *None required.*

Project Impact

4.9-4 Implementation of some of the alternatives would not promote some of the City of Healdsburg's General Plan goals and policies.

A-1, A-4 and A-5

Under the No Project, Limited Gravel Skimming and streamway alternatives, mining would not occur in the vicinity of Healdsburg. Therefore, the impact on Healdsburg General Plan goals and policies would be considered ***less than significant.***

A-2 and A-3

Under the Proposed Project and Gravel Bar Skimming alternatives, mining operations would be visible from Highway 101, a designated scenic highway, and Healdsburg Avenue, which provides a gateway to the city. Since operations in the river would be difficult or impossible to screen from view, these alternatives would not be conducive to the General Plan Urban Design Measures to "provide city/downtown entry/portal treatment" by making "gateways distinctive and memorable; highly imaginable." Reclamation of the mined areas would forward these goals, but in the unspecified future. Therefore, this is a short-term, ***significant and unavoidable impact.***

Mitigation Measures

4.9-4 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.9-5 Construction of the spurs at Healdsburg Bendway would alter the visual characteristics of the site.

A-1 and A-3 through A-5

Under these alternatives, no spurs would be constructed. Therefore, this would be considered a ***less-than-significant impact.***

A-2 The Proposed Project includes the construction of five spurs along the bluff at the Healdsburg Bendway (see Figure 3-18). The spurs would be approximately 48 feet wide at the base, eight feet wide at the top, ten feet high and 100 to 180 feet long. When the

Healdsburg Dam is in place and during heavy storms, the downstream spur would be submerged and 1.5 feet of each of the remaining spurs would be visible above the water line. When the flashboards are not in place, the spurs would be up to 8 feet above the river's surface. The spurs would be constructed of stone and, eventually, covered by dirt carried by the river, which may allow vegetation to take hold. They would be visible from the trailer park, the river, possibly Memorial Park, and the railroad park. During construction of the spurs, heavy machinery would be visible from these areas. The placement of these large, artificial structures in a fairly natural and overgrown portion of the river is considered a ***significant and unavoidable impact.***

Mitigation Measures

4.9-5 *None required for Alternatives 1, 3, 4 and 5. None available for Alternative 2.*

Project Impact

4.9-6 Implementation of some of the alternatives could affect glare in the project vicinity.

Glare, which can be caused by reflections from vehicles and reflective building materials, could be visible from surrounding roadways and to boaters on the Russian River under some of the alternatives. This glare would conflict with the rural nature of the area and views from adjacent areas, characterized by large expanses of undeveloped open space with few sources of light and glare.

A-1 This alternative would not entail gravel extraction on the project site. Consequently, no increase the amount of glare would occur in the project vicinity as a result of this alternative. This is considered a ***less-than-significant impact.***

A-2 through A-5

These alternatives would cause a short-term increase in the amount of glare visible in the project vicinity, due to equipment and truck traffic associated with the extraction and reclamation process. This is considered a short-term ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.9-6 *The proponent shall ensure that all bare metallic surfaces are painted to minimize reflectance. This mitigation measure would be required for Alternatives 2 through 5.*

Complete elimination of project-related glare would be impossible. However, the elimination of exposed metallic surfaces within the project sites would significantly reduce the number of reflective surfaces that might otherwise contribute to glare.

Project Impact

4.9-7 Implementation of some of the alternatives could affect the amount of night lighting in the project vicinity.

A-1 and A-5

These alternatives would not increase the amount of lighting present in the project vicinity. This is considered a ***less-than-significant impact.***

A-2 through 4

Under these alternatives, most mining operations would occur during daylight hours (7 am - 3:30 pm, Monday through Friday). However, activities at the Doyle site could occur until 10:30 PM, which would create a short-term increase in the amount of night lighting present in the project vicinity. The Doyle site is presently undeveloped with sources of artificial illumination. The majority of uses in the surrounding area are agricultural in nature, and therefore generate little or no night lighting. Consequently, night lighting from equipment and trucks used during extended hours of operation could be visible, particularly to nearby sensitive receptors such as rural residents west of the river, and those above the site in the hills northeast of Healdsburg. Project-related lighting could also distract motorists crossing the river on Highway 101 and the Healdsburg Bridge. This is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant level.*

4.9-7(a) *The proponent shall ensure that any equipment-related and overhead light fixtures used in the project area are shaded and directed away from adjacent roadways and residential areas. This mitigation measure would be required for Alternatives 2 through 4.*

4.9-7(b) *The proponent shall ensure that site lighting is only used where necessary for safety and security purposes. This mitigation measure would be required for Alternatives 2 through 4.*

Shaded lighting, if used sparingly and directed away from adjacent uses, would provide adequate visibility for safety and security purposes. This type of lighting would lessen the effects of increased night illumination in the project vicinity.

Cumulative Impacts

4.9-8 Implementation of any of the alternatives, when combined with cumulative development, could affect views in the project vicinity.

A-1 The current view of the project site would not be altered, except as vegetation returns to previously mined areas. Therefore, this is considered a ***less-than-significant impact.***

A-2 through A-5

Development of any of the alternatives, when combined with cumulative development, would result in the eventual alteration of views in the Russian River corridor and, consequently views in the project vicinity. This is considered a ***significant and unavoidable impact.***

Mitigation Measures

4.9-8 *None available.*

REFERENCES

City of Healdsburg, *General Plan,* September, 1990.

Sonoma County, *General Plan,* March, 1989.

Sonoma County Planning Department. *Draft Aggregate Resources Management Plan Draft Environmental Impact Report.* October 1991.

4.10 RECREATION

4.10 RECREATION

INTRODUCTION

This section provides a discussion of recreational opportunities available to the public within the vicinity of the project area. The primary recreational feature of this area is the Russian River, which is the focus of the analysis in this section.

SETTING

Project Vicinity

The Russian River is a popular river affording a variety of recreational opportunities to a multitude of visitors at virtually all times of the year. Throughout its length, the Russian River travels through the entire diversity of scenery, landscape and wildlife habitat available along the northern California coastal area. From whitewater rapids and spectacular coastal mountains in the north through orchards and vineyards in the heart of the wine country and the majestic redwood forests to the Sonoma coastline just north of Bodega Bay, the Russian River affords an important scenic waterway.

The Russian River is used heavily throughout its length for a variety of water-related recreational activities, ranging from passive uses, such as sunbathing, to more active pursuits, such as swimming, sport fishing and recreational boating. Aquatic wildlife is discussed fully in Sections 4.6, Fish Resources and 4.7, Terrestrial Biological Resources, of this report. The Russian River is host to a variety of sport fish including smallmouth bass, bluegill, catfish, carp, Sacramento squawfish, steelhead, and silver salmon.

Project Location

Recreational uses in the project area are limited by a general lack of public access to the river banks. Sections of the river south of Healdsburg Veterans Memorial Park are virtually inaccessible to the public without trespassing on private land. This effectively restricts the number of users to those willing to travel entirely through the project area, or those willing to walk downriver from public access points.

Evidence along the project area suggests that the area receives moderate to heavy use despite a general lack of easy public access to the river. A local canoe trip operator offers at least one trip

plan that travels through the project area. Additionally, the project area sees seasonal use for sport fishing, primarily from small boats, canoes and persons on foot.

In addition to fishing, the riparian area offers ample opportunity for other recreational pursuits, such as birdwatching, wildlife observation, photography, hiking and swimming. A number of rope swings and pathways through native growth exist along the river, indicating substantial use of the large number of swimming holes and small beach areas.

Improved facilities are offered at the Healdsburg Veterans Memorial Park, located just off Healdsburg Avenue on the east bank of the river. This facility is located immediately downstream from the Healdsburg Bendway (Site 5), and is administered by the Sonoma County Regional Park Department.

The Healdsburg Memorial Park is a full-service public facility, providing paved parking for approximately 140 vehicles, outdoor showers for rinsing, restrooms, water fountains, a playground facility, sand volleyball court, beach area, grassy areas, shaded areas, restricted swimming area, a diving platform, barbecues, picnic benches and lifeguards. The area also has a kitchen and concession facility. Parking is a $3.00 fee, with annual passes available for $30.00.

The Healdsburg Memorial Park swimming area is located immediately upstream from a seasonal dam which restricts in-river traffic. Waterborne craft must portage around the dam at this point. Access to the downstream area is through an unimproved trail open for pedestrian/portage use. This provides an important launch site and portage area for portable watercraft, such as rafts, canoes and "tubers" (inflated tire tubes used to drift downriver). The area around the park receives moderate to heavy use, particularly on weekends and holidays.

The City operates a park on the north bank of the river, between Healdsburg and railroad bridges. A vertical wall along the river bank prohibits physical access to the river, but visual access exists. The park is used for picnicking, fishing and river viewing. A private trail exists along the north bluff above the Riverbend side. It is an amenity in the common area of a residential planned community.

History

The project area has experienced limited public access from the riverbanks due to private ownership of land along both sides of the river south of the Healdsburg Memorial Park. The presence of large landholdings, primarily in agricultural uses, has restricted much of the river to persons passing completely through the project area. Limited use of the river immediately south of the Healdsburg Memorial Park and Highway 101 bridge occurs from persons on foot or bicycle. Some landowners within the area have permitted some trespass activity on a limited basis for persons travelling through their property to gain access to the river. Vehicular access to the river appears to have been generally limited to the property owners and authorized persons on both sides of the river.

City and County General Plan and Policies

City of Healdsburg General Plan

The City of Healdsburg General Plan, adopted in 1987, contains the following goals and policies affecting the recreational use of the Russian River.

Section VI: Cultural and Recreational Resources

Goal A: To establish and maintain a park system that is suited to the needs of Healdsburg residents and visitors.

Policies:

1. The City shall expand the community and neighborhood park system with the goal of providing park facilities within reasonable walking distance of all city residential areas.

3. City park acquisition and development efforts shall be based on a goal of 5 acres of developed neighborhood and community parkland per 1,000 residents within the Urban Service Area.

7. The City shall continue to assess park development fees on all new commercial, industrial, and residential development sufficient to fund systemwide park improvements. The park development fee schedule shall be periodically reviewed and revised as necessary.

8. The City shall not purchase any parkland not listed on the City's list of potential park sites (see Figure II-3 and accompanying list).*[see discussion below for properties in the vicinity of the project area]* However, in very limited circumstances, the City may accept dedications of land and/or improvements in lieu of fees for parks listed or not listed on the City's list of potential park sites or shown on the City's Park Master Plan after a careful analysis of proposed land and/or improvements to determine the appropriateness of location and the feasibility of development and maintenance.

The above policies provide the City of Healdsburg's framework for parks and recreation space. These policies are relevant to that portion of the project area that lies within and adjacent to the Urban Services Boundary of the city. In addition, three "potential park sites" identified in the General Plan lie adjacent to the river. These are described in the General Plan, page 50, as follows:

9. Neighborhood Park - A neighborhood park of approximately one acre located adjacent to the Russian River north of the railroad tracks.

10. Regional Park - A regional park of 10 to 30 acres adjacent to Memorial Beach, developed by or in conjunction with the County. [Note: currently Syar processing plant]

11. Regional Park - An expansion of Memorial Beach to the south, developed by the County.

Implementation of the alternatives could have secondary effects on future park development at these potential sites as a result of noise, dust, or degradation of scenic qualities.

Sonoma County General Plan

Open Space Element

Goal OS-7: Establish a countywide park and trail system which meets future recreational needs of the county's residents while protecting agricultural uses. The emphasis of the trail system should be near urban areas and on public lands.

Objective OS-7.1: Provide for adequate parklands and trails primarily in locations that are convenient to urban areas to meet the outdoor recreation needs of the population, while not affecting agricultural uses.

The County shall use the following policies to achieve this objective:

OS-7a: Apply the "Public-Quasi Public/Park" designation to all existing local, county, and state parklands.

OS-7d: The trails on Figure OS-4a on page 243 make up the County's designated plan for trails. Trail locations are approximate and are described below. Roadways may be used where access cannot be obtained through private property.

3. Russian River Waterway Trail. The Russian River is a navigable waterway from Cloverdale to the coast and as such, public access is protected by Article XV, Section 2 of the California Constitution. This proposed waterway trail extends from the coast to Preston Bridge immediately north of Cloverdale.

Classify potential trails as follows:

1) Recreational Waterways: Recognize boating and canoeing activities on designated waterways. Limit hiking trails to connections between urban areas, parks and the waterway.

The above policies establish the Russian River within the project area as a potential "Recreational Waterway" trail. Additionally, these policies reassert the right of public access to and through the waterway under California state law. Accordingly, activities that would restrict public access would not be allowed, and could be considered inconsistent with the General Plan designation for the Russian River Waterway Trail.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For purposes of this EIR/EIS, a significant adverse impact to recreation would occur if an alternative would:

- reduce public access to the river,
- restrict the travel of water-borne craft through the project area,
- reduce the recreational value of the project area through a degradation of recreational opportunities, or
- reduce the recreational quality of facilities located at the Healdsburg Veterans Memorial Park or the City's Railroad Park.

Method of Analysis

It is generally not possible to strictly quantify the recreational value of a resource such as a river, due to the largely subjective nature of recreational pursuits. For example, even in the instance of sport fishing, one fishing enthusiast may place little value on the aesthetic surroundings of the river provided that the quality of fishing remains equal, while another enthusiast may place a lesser value on the quality of fishing than on the aesthetics of the natural surroundings. Likewise, one water traveller passing along the Russian River may view terrace mining as an interesting counterpoint to the natural scenery both upstream and downstream of the project site, while another traveller may regard the interruption in natural scenery a substantial degradation of their overall experience.

For the analysis in this EIR/EIS, the entire river stretch was viewed from the river by canoe and from the levees by vehicle wherever possible. Public access points immediately upstream and downstream of the project site were visited, and recreational pursuits of visitors were monitored over a three-day period (covering a weekend) in mid-July of 1991. Observations and impressions are the result of both the observations of the consultant team and informal interviews with recreational users at the river.

Project Impact

4.10-1 Public access through the project area via water-borne craft could be restricted.

A-1 and A-5

Under Alternatives 1 and 5, no new crossings, other than those already permitted, would be constructed. This is considered a ***less-than-significant impact***.

A-2 through A-4

The construction of temporary in-stream water crossings necessary for the passage of equipment would restrict the travel of water-borne craft through the project area. This would require the portage of such craft around or over the crossings. For craft transporting persons and equipment through the project area, this could be troublesome as such crossings are typically steep banks constructed of gravel and culverts which are difficult to traverse on foot. This is considered a ***significant impact***.

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.10-1 *Temporary in-stream crossings that are otherwise impassible to water-borne craft shall be designed and constructed so that water-borne craft may be portaged around or over the obstruction. Portage locations shall be clearly identifiable by river travellers, and shall include pathways that permit visibility along the haul road by vehicles and equipment, and have banks or shoulders that are sloped gently enough to permit portage by canoes and drift boats. Such crossings shall be inspected regularly by the Sonoma County Regional Park Department to determine the safety and adequacy of the portage locations. This measure would be required for Alternatives 2 through 4.*

Project Impact

4.10-2 Implementation of the alternatives would restrict public access to the Russian River in the vicinity of the project site.

A-1 through A-5

Existing public access to the Russian River is heavily restricted in the project site vicinity, with the exception of the Healdsburg Veterans Memorial Park site. The proposed project would not alter public access from the banks to the river at existing public access areas. Some areas currently used through trespass would be restricted. However, as this access takes place across private land, no significant effect to public access would occur. Under each alternative, the public access to the river would remain approximately as difficult as it is currently. Therefore, this is considered to be a ***less-than-significant impact***.

Mitigation Measure

Although no mitigation measure is required, implementation of the following mitigation measure is recommended to further reduce impacts on recreational uses.

4.10-2 *The project proponents shall provide public access to the Russian River at a point downstream of the Healdsburg Veterans Memorial Park which is accessible to vehicles*

transporting water borne craft. Such public access shall be coordinated through the Sonoma County Regional Park Department, and shall be operated so that project proponent liability is minimized and public access is ensured during periods of peak use. This measure is recommended, but not required, for Alternatives 2 through 5.

Project Impact

4.10-3 Mining operations immediately upstream of the Healdsburg Veterans Memorial Park and the City's Railroad Park could reduce the recreational value of the parks.

A-1, A-4 and A-5

Alternatives 1, 4 and 5 would not result in mining in the immediate vicinity of Memorial Beach. This is considered to be a ***less-than-significant impact.***

A-2 and A-3

Mining operations upstream of the Healdsburg Veterans Memorial Park at the Healdsburg Bendway site could result in a reduction of the recreational value of the park due to aesthetic impacts of mining within view of the park, potential degradation to water quality at the park swimming area, and increased noise from mining operations. The park's heaviest use is when the summer dam is in place, from Memorial Day through Labor Day. Since excavation is scheduled to begin after the dam is removed, mining would not interfere substantially with recreational activities. Therefore, this is considered a ***less-than-significant impact.***

Mitigation Measure

4.10-3 *None required.*

Project Impact

4.10-4 Implementation of the alternatives could result in an alteration of the recreational value of the Russian River in the rural areas adjacent to the project area.

A-1 Under the No Project Alternative, the river would gradually return to a more natural state given the current geological and hydrological characteristics of the river bed. This is considered a ***less-than-significant impact.***

A-2 Mining along the river would alter the recreational value of the project area for activities such as bird watching, photography, and water travel. Alterations to the streambed would alter the sport fishing characteristics of the river, eliminating some fishing spots and creating others. The numbers of some species of fish may be reduced (see Section 4.3, Fish Resources). Views experienced by all persons travelling the Russian River in the project vicinity would be altered. These alterations would substantially change the

recreational value of the project area from its existing condition. Due to the heavy use of the entire length of the Russian River, primarily by water-borne travellers and recreation enthusiasts, this is considered a ***significant and unavoidable impact.***

A-3 and A-4

Under the Gravel Bar Skimming and the Limited Bar Skimming Alternatives, mining and reclamation activities would reduce the recreational value of the project area for bird watching, hiking, water travel and similar pursuits, although to a lesser degree than Alternative 2. This is considered a ***significant and unavoidable impact***

A-5 No in-channel activities would occur under the Streamway Alternative. Terrace mining at the Doyle and Middle Reach sites would create visual impacts (see Section 4.9). Since mining would occur on private land and out of the river, it would not interfere with river-based activities. Therefore, this is considered a ***less-than-significant impact.***

Mitigation Measures

4.10-4 *None required for Alternatives 1 and 5. None available for Alternatives 2 through 4.*

Project Impact

4.10-5 Implementation of the alternatives could affect the recreational activities of Healdsburg residents and visitors.

A-1, A-4 and A-5

No project-related mining or reclamation activities would occur in or near Healdsburg under these alternatives. Therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

Under the Proposed Project and the Gravel Bar Skimming alternatives, inchannel excavation upriver of the railroad bridge could interfere with boating and swimming, as well as more passive river-related activities. Since work at the Healdsburg and Riverbend sites would occur for only two months at a time and not every year, this is considered a ***short-term significant and unavoidable impact.***

Mitigation Measures

4.10-5 *None required for Alternatives 1, 4 and 5. None available for Alternatives 2 and 3.*

Project Impact

4.10-6 Construction of the spurs could affect river-related recreational activities.

A-1 and A-3 through A-5

Under these alternatives, the spurs would not be constructed. Therefore, this is considered a ***less-than-significant impact.***

A-2 Under this alternative, five spurs 100 to 180 feet long would be constructed at the Healdsburg Bendway. Four of the spurs would always be visible; 1.5 feet above the surface when the dam's flashboards are in place and 8 feet above low flow levels. During the summer when the flashboards are placed in the dam, the downstream spur would be under approximately 8 feet of water. However, when the flashboards are removed and the river elevation drops, the spur would be within 2 feet of the river's surface, where it could present an obstacle to swimmers and boaters. Therefore, this is considered a ***significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.10-6 *Signs shall be posted warning of the location and depth of the spurs. This measure is required for Alternative 2.*

Cumulative Impacts

4.10-7 Mining and reclamation activities could exacerbate existing and future restrictions to the movement of waterborne craft through the project area.

Under all of the alternatives, the existing seasonal in-stream crossing of the Russian River just north of Highway 101 would continue to be constructed on an annual basis, and would be in place from late spring through fall. Although the design of this stream crossing would be changed to include a "flat car" crossing (see Figure 5-1), passage under the flat car portion of the crossing may be difficult at certain stages of the river. It should be noted that passage through the box culvert portion of the crossing has historically been difficult due to a slight drop which has developed at the downstream end of the culvert.

A-1 Under the No Project Alternative, no new crossings would be constructed, so movement through the project area would not be further restricted. Therefore, this is considered a ***less-than-significant impact.***

A-2 through A-4

The new crossings constructed under these alternatives would exacerbate the restrictions placed on boat and canoe travel by the annual construction of the Russian River crossing north of Highway 101. Therefore, this is considered a ***significant impact.***

A-5 No new stream crossings would be constructed under this alternative. Because the lower terrace created under this alternative could be reclaimed for recreational purposes, recreational opportunities may improve in the long run. This impact is considered ***less-than-significant.***

Mitigation Measure

4.10-7 *Implement Mitigation Measure 4.10-1. This measure would be required for Alternatives 2 through 4.*

4.11 CULTURAL RESOURCES

4.11 CULTURAL RESOURCES

INTRODUCTION

This section addresses impacts of the alternatives on known and potential archaeological and historical resources in the project area. For a complete discussion of the history and prehistory of the project area, see Appendix F.

SETTING

Project Vicinity

The project area is located on the Healdsburg U.S.G.S. topographic map within Township 8 North and 9 North, Range 9 West, unsectioned (see Figure 3-1).

The project area lies within the Russian River flood plain, in a relatively flat north-south valley which extends from Eastside Road on the east to Westside Road on the west. The valley width in this area ranges from approximately three-quarters of a mile at the southern end to approximately two miles at Healdsburg. Differences in elevation from the river to the hillside terraces on the east range from only 10 feet at the southern end to 30 feet immediately south of Healdsburg on the north. On the west side they range from 40 feet on the south to 30 feet in the middle area near Dry Creek. These lands have long been planted in grapes, prunes, hops, and appear to have been artificially levelled to some degree.

Prehistory/Archaeology

Studies indicate a long history of human habitation in the project area, with the earliest date at 12,000 B.P., a second, more intensive use period between 8,000 to 6,000 B.P., and a third period from 5,000 to 3,000 B.P.[1,2]

More than 1000 surveys have been done in the Russian River subregion and more than 100 sites excavated. The speakers of the Yukian language are believed to have been the earliest inhabitants of this area.[3] The appearance of a millingstone culture in the Lower Archaic Period (6,000-3,000 B.C.)[4] may correlate with the arrival of Hokan speakers.[5] These people are believed to have arrived in the Clear Lake area from the east or northeast about 5,000 B.C. as part of a northward movement of Hokans from southern California.[6] This may have been in response to an environmental change to a warmer and drier climate and the shrinking of pluvial lakes at this time.[7] The effect of this trend in the north state may have produced increased

growth of oaks in the hills, replacing previous conifer forest and increasing the food resource base.[8]

The Russian River Valley had been proposed as the original Pomoan settlement;[9] however, some linguists now consider the Clear Lake area more likely.[10,11] It is believed that the Pomos came to the Russian River valley rather early, probably after 3000 B.C., near the peak of the warming trend, and the western Pomo languages subsequently developed here.[12] The development of these western languages coincident with the recent ethnographic territories may have occurred around 500 B.C. at the end of the warming trend and the beginning of the present cooling period.[13,14] It is believed that the ancestral Western Pomo territory was the upper Russian River valley, and that the spread into the areas now recognized ethnographically occurred in the Middle Archaic Period (3,000-1,000 B.C),[15] and may be distinguished by use of the millingslab (metate) and handstone (mano) as well as by non-fluted concave-base and lanceolate projectile points. These items have origins at the Clear Lake basin and subsequently were introduced into southern North Coast Range areas held by non-Pomo peoples.[16]

Thousands of years of cultural shifts and development suggest that different areas within the Russian River drainage will exhibit variations in cultural sequences. Assemblages may reflect early and long Yukian habitation, followed by subsequent Pomo usage. New technologies and forms from other regions are also likely to be present, as well as reflections of environmental changes.[17]

Ethnography

The current project area is located within the territory of the **Southern Pomo**, one of seven groups lumped by anthropologists under the **Pomo** label. Southern Pomo language was most closely related to the Kashaya who lived along the coast to the west, and to the Central Pomo to the north and northwest; such languages were estimated to be approximately as close as Italian, Spanish and French are to each other.[18]

Social divisions consisted of tribal villages, each completely autonomous and owning its own tract of land which was recognized by all neighboring communities. The main settlement within each group generally appeared to have been fixed for generations.[19] Tribal areas appeared to have related to the nature of the terrain, its ecology and the type of adaptation to that ecology. The amount of land was determined by the need to assure access to a sufficient supply of food and may have varied over time. This resulted in some areas having several communities in close approximation (such as the Russian River area) and others more sparsely inhabited.

Early ethnographic observations of these peoples were sparse, consisting of actual written observations only by Powers (1877) and Gibbs (1853). Many details from Powers come from conversations with early White settlers and were not confirmed by subsequent field work. Later scholars (Barrett, Gifford, Kroeber and others) depended mostly on descriptions of pre-contact society often given by a small sampling of survivors, generally in English and with little preparatory field work. Furthermore, most work was conducted with members of the Northern,

Central and Eastern Pomo groups, with little information from Southern, Kashaya, Southeastern or Northeastern Pomo people.[20]

Southern Pomo territory extended from about five miles south of Santa Rosa northward for approximately 40 miles, and from the eastern drainage of the Russian River westward to Kashaya territory with a relatively narrow extension to the coast between Kashaya and Central Pomo territory just south of Gualala. A section of the Russian River from just north of Geyserville to due east of Healdsburg was conquered by the Wappo in the early 19th century.[21] Communication between the northern and southern people then was through the Dry Creek valley which parallels the Russian River approximately four miles to the west.

The Southern Pomo from the southernmost portion of their territory were adversely affected in the early days of contact with Europeans by missionization, Mexican slave raids, disease and immigrant settlement. Ethnic identity was lost several generations ago in the Santa Rosa and Sebastopol areas, but a dozen or so speakers remained in Healdsburg and to the north by 1976.

Pomo settlements in the Healdsburg area include *Wo·tokhʰa ton*, east of the Riverbend mine site; *Kʰal·e*, at Healdsburg; *Kʰato wi*, on the southeast of Healdsburg at a former lake/marsh, *Am·ata yow* on Mill Creek at the confluence with the Russian River, *Çoł·iko wi* near East Windsor (east of the River), and *Ya-Ka-Ama* south of the bend south of the Doyle Plant.[22]

Village settlement was primarily in the inland valleys, away from the coastal fog and dense redwood forests, although small seasonal campsites did exist along the coast. The largest coastal population lived near the mouth of the Russian River and along creek banks. This is an area of grassy, rolling hills with scattered oaks and more mild climatic conditions. The acorn was the primary plant food in the valley, with strong dependence on game which was plentiful in the grasslands. Streams and rivers were also fished. The larger inland villages often had smaller satellite villages nearby, generally bound to the larger villages by economic, social and kinship ties. The largest, densest populations occurred in the south-central section.[23]

Subsistence was based on acorns, along with buckeye, various berries, seeds, roots and bulbs, edible greens as well as dried seaweed and kelp at the ocean. Hunting of game was the most important activity for the men, both individually and communally. Deer, elk, antelope, rabbits and squirrels were all important. Birds were also taken (although some were taboo) and feathers were also important for decoration of persons and baskets. Fish, both fresh and salt-water, were also an important food source.[24]

Technology included ground stone hopper mortars and pestles and flaked stone knives and projectile points (usually of obsidian or chert). Bone was used notably for awls and fish hooks. The most noteworthy technological accomplishment was probably the beautiful basketry for which the Pomo are noted. A great variety of techniques and forms were developed. Coiled ware was made in both single or three-rod, twined ware in seven forms, and wicker ware was also used. Feathers and beads were used for basket decoration. Clothing was made from vegetal fiber or from skins, skins usually being sewn with fibers. Women usually wore "grass" skirts made of shredded willow (inland) or redwood bark (coastal), or of leather.[25] Another extremely

important technology was the making of marine shell beads, both for personal adornment and also as a medium of exchange, which were traded throughout California and also into the Great Basin[26]. Structures were made of slabs of redwood bark on the coastal and adjacent forested areas, and of brush, grass or tule at inland areas. Semisubterranean structures were built for special purposes, such as the smaller sweat houses used by the men,[27] and larger (70' diameter) community assembly houses for dances and ceremonials.[28,29]

Social organization consisted of tribelets of one or more bilaterally related extended kin groups ranging in size from 100 to 2,000 persons.[30] Each extended family had a headman or minor chief. These family chiefs composed the tribelet council. Although tribelets were independent units, some confederation did occur. One such confederation existed on the Russian River, controlling 16 miles of the river and adjacent lands as far as the surrounding hills. Seven kin groups of the Skokowa tribelet along the river were so linked, with one elected "war chief", apparently for military advantage. This may have been the most complex organization of any Pomo group.[31] Pomo also maintained regular military and trade alliances among themselves and with several non-Pomo groups.[32] It has been estimated that the aboriginal Southern Pomo population totaled between 3,950 to 6,300.[33]

Contact Period

The first contact with Europeans may have occurred with Sir Francis Drake's 1579 visit to Coast Miwok territory. By the end of the eighteenth century, trade goods were arriving from San Francisco's mission and presidio and the Spanish were raiding the southern Pomo area for converts. By 1817, the mission was established at San Rafael, recruiting as far north as Santa Rosa, and in 1823 the Mission San Francisco de Solano was established at Sonoma. At least 600 Pomoans were baptized at the Sonoma and San Rafael missions. The Pomoans were noted by the Spanish as being exceptionally intelligent and correspondingly difficult to "control".[34]

The Russians also entered the scene by establishing trade relations in 1809 with the Coast Miwok at Bodega Bay, and developing Fort Ross in 1811 in Kashaya territory. They maintained a policy of nonintervention and cooperation with the Indians, and contracted with the Pomo for use of an area one by two miles in extent. An agricultural colony was established at Fort Ross, with over 100 Pomoans employed as laborers. Many Pomos learned to speak the language, and adopted some culture and religion, occasionally intermarrying with Russians.[35,36,37]

With California becoming part of the Mexican Republic in 1822, new land grants were established in Pomo territory and military control was exerted. Mexican colonies were established in Southern and Central Pomo territory and between 1834 and 1847 Pomo villages were raided for captive slaves. By 1838, all Southern and Central Pomo territory was in Mexican hands. In 1833, an epidemic of cholera or malaria depopulated many Pomo villages and, in 1838-39, thousands more died in a smallpox epidemic.[38] By the 1850s, many disruptions had decimated and overwhelmed the Pomos and their culture as EuroAmericans moved into the territory, often with hostile results, always with economic and cultural change. By 1911, various missionary groups, both Catholic and Protestant, had begun working with the Pomoans, including

those groups to the north and northeast. These activities helped formulate Indian civil rights organizations for self-help in housing, education, health care and legal matters.[39]

Historic Background

The historic background of Sonoma County and the project vicinity is described in Appendix F.

Archaeological and Historical Sensitivity

Record Search

A record search of previous archaeological surveys and standard published and unpublished reports were researched for information on the project area.

The Russian River area was a very important locale of Native American habitation in the past and is thus a very sensitive cultural location. Several previous surveys have been performed on properties on and adjacent to the project, as well as along Dry Creek itself.

Thirteen archaeological surveys have been performed in this area. Three were done in the area of the subdivision on the north bank of the river in the eastern portion of Healdsburg, north of the Bendway location. Another survey was performed on land east of the Syar plant. Two other surveys covered land immediately south of Healdsburg north of the river crossing of Highway 101. Another survey was done at both sides of Dry Creek, west of the Russian River where a large prehistoric village site (CA-Son-633) was located.[40]

Surveys in the immediate area of the current project included a two-mile survey performed along Highway 101, with negative findings;[41] a survey in the vicinity of North Levee where an important prehistoric/ethnographic village site (*Maka'smo*/CA-Son-1758; for ethnographic description, see Barrett 1908:216) was located;[42] a large survey on the west bank of the river south of North Levee to the north end of Middle Reach where the open extraction pits are located,[43] with negative findings; a survey east of the South Levee Haul Road location, with negative findings; and two surveys on the west bank west and northwest of the Doyle Plant, also with negative findings.[44]

The only listed Historical Landmark in the vicinity of the project is #893, the Walters Ranch Hop Kiln located at 6050 Westside Road, considered the most significant surviving example of a stone hop kiln in the North Coast. It was built by Angelo Sodini in 1905 and served the Russian River Valley and north coast, one of the West's major hop-growing areas. In the late 1800s Sol Walters purchased 380 acres of the Sotoyome Rancho from Josefa Fitch. The Rancho was patented in 1853.[45]

Listings on the National Register include the Healdsburg Carnegie Library at 221 Matheson Street, listed July 6, 1988; the Madrona Knoll Rancho District (Madrona Manor) at 1001 Westside Road, listed on April 2, 1987; the Dry Creek-Warm Springs Valleys Archeological District, listed December 9, 1977; and the Walters Ranch (Griffin Vineyard; Sweetwater Ranch),

at 6050 Westside Road, listed on October 7, 1977. Also listed as eligible for the National Register is the historic truss bridge (#20C-65), Healdsburg Avenue at the Russian River, determined eligible on December 24, 1985.

Field Survey

Two field surveys were conducted on foot in August and October of 1991. No evidence for prehistoric use was present on any of the proposed mining site surfaces. No significant historic artifacts or sites were located on any of the mining sites. Various items of contemporary and possible earlier use were noted, but all were isolate finds, with little or no integrity of context--items that had been tossed into the river or lost and appeared to have been moved about by the currents of the river. A few recent campfire sites were noted, but contained nothing of any historic significance.

At the Healdsburg Bendway site, several artifacts were noted, including some mortared bricks, a strip of angle iron, a woman's shoe and a wooden boat rudder.

Ceramic fragments (white glazed, red utility flower pot), plaster with wire, red brick fragments, one piece of scrap iron, and a large fragment of red-backed *Haliotis* shell, a recent deposit, were found at the North Levee site.

At the Middle Reach site, the only artifacts noted were some old rubber car tires.

The South Levee Haul Road site contained a crumpled metal 50 gallon drum and some rusty impressed sheet metal, both on the southern bar.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

Appendix K of the CEQA Guidelines states that a project would result in a significant impact if it would damage a significant archaeological or historical resource. Recommendations, pursuant to CEQA, are as follows:

- Public agencies should "seek to avoid damaging effects on an archaeological resource whenever feasible." If avoidance is not feasible, the importance of the site shall be evaluated using the criteria below.

- In-situ preservation is the preferred manner of avoidance, as the relationship of artifacts to each other in more important than the sum of their parts. Avoidance also provides opportunities for future research on sites, and avoids conflict with religious and cultural values.

- Avoidance may be accomplished by planning construction to miss sites and by planning parks or other open space to incorporate sites.

Loss of or damage to a cultural resource is considered significant if the resource fits one of the following criteria:

A.1 Association with an event or person of recognized significance in California or American history.

A.2 Association with an event or person of recognized scientific importance in prehistory.

B. Can provide information which is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable or archaeological research questions.

C. Has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind.

D. Is at least one hundred years old and possesses substantial stratigraphic integrity, or

E. Involves important research questions that historical research has shown can be answered only with archaeological methods.

NEPA Guidelines state that an impact may be considered significant if:

- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. (40 CFR 1508.27(b)(3).
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources. (CFR 1508.27(b)(8).

Section 106 of the National Historic Preservation Act requires that project effects on significant historic properties be addressed. Significant resources are those properties that are listed or are eligible for listing on the National Register of Historic Places. Department of Interior regulations describe the National Register criteria for listing (36 CFR Section 60.4, cited in Advisory Council on Historic Preservation 1986b):

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:
>
> A. are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. are associated with the lives of persons significant in our past; or
>
> C. embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a

significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield, information important in prehistory or history.

Appendix C to Part 325 of 33 CFR contains the procedures used by the COE to fulfill the requirements of the NPHA and other historic preservation laws applicable to COE projects. The appendix includes procedures for determining whether historic property is located in a proposed project area, the potential that the property is eligible for listing in the National Register, and the effects of the project on the property. In addition, public notice, agency review and consultation, and emergency procedures are addressed.

Method of Analysis

Archival Research

A Record Search was performed at the Northwest Information Center of the California Archaeological Inventory at Sonoma State University for data on previous archaeological surveys and site findings. Various standard published and unpublished reports were researched for information on this location and its surroundings[46].

Additional research was conducted at the California State Library, the Sacramento City/County Library and the Bureau of Land Management, where various other manuscripts, publications and maps were reviewed. Interviews were conducted for specific ethnographic information on the native peoples of this area, as well as for historical information.

Field Survey

The six proposed gravel mining sites were intensively inspected on foot on August 27 and on October 17, 1991, in order to detect any signs of prehistoric or significant historic use. The team walked the proposed site of Doyle Plant (using 20 meter transects where possible) as well as portions of the Middle Reach and North Levee sites. The sites of Riverbend and Healdsburg Bendway were under water in August due to the closing of the dam at Healdsburg. Additionally, there were some problems of access at the South Levee Haul Road site and on the east bank. On October 17, a second phase of the survey was performed on these sites, along with the eastern banks of North Levee and Middle Reach.

In general, the gravel bars were thoroughly inspected over the sites as delineated on the project maps. In a few small areas, dense foliage prevented complete access to parts of bars at North Levee, Middle Reach and South Levee Haul Road.

Project Impact

4.11-1 Implementation of the alternatives could affect unknown buried cultural resources along the Russian River.

A-1 Implementation of this alternative would not affect cultural resources since mining is not proposed. This is considered a ***less-than-significant impact.***

A-2 through A-5

It is always possible for previously unknown buried cultural deposits to be recovered as excavation and grading occur. Under Alternatives 2 through 4, excavation would occur in the terrace at the Doyle site. The Middle Reach terrace would be mined under Alternative 5. Cultural resources buried in the terrace could be unearthed during mining operations at these sites.

The CA-Son-1758 site described in the setting section is approximately 550 feet from the riverbank of the North Levee site. Since it is on the east side of the river and mining activities would be confined to the river and the west side of the river, the alternatives are not likely to affect the CA-Son-1758 find. However, there may be buried resources extending from the find to the river's edge, which could be exposed and/or make their way into the riverbed as a result of erosion. Consequently, the likelihood of exposing cultural resources at the North Levee site is considered somewhat more probable than at the other in-channel sites. Because the potential exists to unearth important cultural remains, this is considered a ***potentially significant impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce this impact to a *less-than-significant level.* These measures would be required for Alternatives 2 through 5. Note: These measures are consistent with or identical to those found in the *1992 Sonoma County ARM Plan Draft EIR.*

4.11-1(a) *When Native American archaeological, ethnographic, or spiritual resources are involved, all identification and treatment shall be conducted by qualified archaeologists who are either certified by the Society of Professional Archaeologists (SOPA) or who meet the federal standards as stated in the Code of Federal Regulations (36 C.F.R. 61), and Native American representatives who are approved by the local Native American community as scholars of their cultural traditions. In the event that no such Native American is available, persons who represent tribal governments and/or organizations in the locale in which resources may be affected shall be consulted. When historic archaeological sites or historic architectural features are involved, all identification and treatment is to be carried out by historical archaeologists or architectural historians,*

respectively. These individuals shall meet either SOPA or 36 C.F.R. 61 requirements.

4.11-1(b) *Prior to commencing mining operations at the Doyle or North Levee sites (and the Middle Reach site under Alternative 5), a cultural resources orientation shall be conducted to acquaint project personnel with the nature of cultural resources potentially present; the potential significance of these resources to the archaeological, Native American, and historic architectural communities and to the public; and procedures for treatment of the resources when they are found. This orientation shall include a presentation by at least one representative each of the archaeological, Native American, and historical communities, as appropriate.*

4.11-1(c) *The COE archaeologist shall be notified of the date and time of the orientation so that he or she may attend. The project proponent shall develop a written plan for treatment of discovered cultural resources, and submit the plan to the City, County and COE for review prior to the orientation. Based on the orientation presentations and proponent's plan, printed materials shall be distributed to those attending the orientation. Upon the discovery of cultural resources during excavation or associated activities, the shift foreperson shall be immediately notified and shall be responsible for immediately notifying the Planning Department, which shall then notify NWIC and Ya-Ka-Ama, and the COE District Engineer. If the discovery occurs during ground-disturbing activities, all work shall be immediately halted in the vicinity of the find until the County's archaeological and Native American consultants have evaluated the find and mitigated associated impacts. Discovered cultural resources shall be stored in a protected environment to prevent vandalism, damage, or theft, until such time as they are examined by an archaeologist and Native American, as appropriate.*

4.11-1(d) *All Native American artifacts discovered during aggregate production or processing shall be turned over to the Native American community through Ya-Ka-Ama which shall be responsible for the disposition of these materials. Arrangements for prior study by the archaeological community shall be developed by the County's archaeological consultant and Ya-Ka-Ama prior to the final disposition of the discovered materials. These arrangements shall include time frames for archaeological study and mechanisms for transposing the materials to Ya-Ka-Ama.*

4.11-1(e) *If human bone or bone of unknown origin is found during aggregate production, all work shall stop in the vicinity of the find and the County Coroner, Ya-Ka-Ama, the Planning Department staff, and the COE shall be contacted immediately. If the remains are determined to be Native American, the Coroner shall notify the Native American Heritage Commission who shall notify the person it believes to be the most likely descendant. The most likely descendant shall work with the aggregate operator to develop a program for reinterment of the human remains*

and any associated artifacts. No additional work is to take place within the immediate vicinity of the find until the identified appropriate actions have been carried out.

4.11-1(f) *All actions taken to identify, recover, store, process, curate, or reinter archaeological materials and human remains shall be overseen by the Planning Department, in consultation with the COE, with associated expenses borne by the proponent.*

Project Impact

4.11-2 Within the City of Healdsburg, cultural resources could be uncovered by mining activities.

A-1, A-4 and A-5

This alternative would not affect cultural resources in the Healdsburg area, since no mining or reclamation would take place at the Healdsburg Bendway. Therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

Under the Project and Gravel Skimming alternatives, gravel bed extraction would occur at the Healdsburg Bendway. Five spurs would be constructed adjacent to the bluff. Since the Healdsburg Bendway is in a very disturbed area, these activities are unlikely to uncover any sensitive resources. Nonetheless, prehistoric or historic artifacts may be buried in the terrace or have migrated into the river bed. Therefore, this is considered a ***potentially significant impact.***

Mitigation Measure

Implementation of Mitigation Measure 4.11-2 would reduce the above impact to a *less-than-significant level.*

4.11-2 *Implement Mitigation Measure 4.11-1. This measure would be required for Alternatives 2 and 3.*

Cumulative Impacts

As no significant prehistoric or historic sites were located within the project boundaries, cumulative impacts are not identified.

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4.12 TRAFFIC

4.12 TRAFFIC

INTRODUCTION

This section identifies impacts on local and regional traffic conditions resulting from the implementation of the proposed reclamation plans and alternatives, and recommends necessary measures to mitigate those impacts.

SETTING

Project Vicinity

The project area is located within the County of Sonoma, south of and within the City of Healdsburg. Major roadways within the vicinity of the project include Highway 101, Old Redwood Highway, Healdsburg Avenue, River Road, Mark West Springs Road, and Fulton Road (see Figure 4.12-1).

Project Location

The project encompasses six separate mining sites along a nine-mile reach of the Russian River, beginning at river-mile (RM) 25 north of Wohler Bridge and ending at approximately RM 34 just east of Healdsburg.

For the purposes of this analysis, the study area is bounded by Westside Road on the west and north, Highway 101 on the east, River Road on the south and, in the case of sites 5 and 6, the City of Healdsburg to the north. Table 4.12-1 displays the characteristics of the existing roadways within the study area.

History

Regional Patterns

Gravel trucks from operations within the region use the following public roadways: Eastside Road, Westside Road, Old Redwood Highway, Trenton-Healdsburg Road, Wohler Road, River Road, Windsor River Road, Mark West Springs Road, Fulton Road, Brooks Road, Arata Lane, and Highway 101. In addition, a private haul road located along the west side of the Russian River, south of Healdsburg is used (see Figure 4.12-1). According to the County Public Works Department, there are no "designated" truck routes in the County.

TABLE 4.12-1

EXISTING STREET SYSTEM CHARACTERISTICS

Segment	Classification	Lanes
U.S. Highway 101	Freeway	4
Old Redwood Highway	Primary Arterial	2
Eastside Road	Secondary Arterial	2
Trenton-Healdsburg Road	Local	2
Healdsburg Avenue	Primary Arterial	2
River Road	Primary Arterial	2
Westside Road	Secondary Arterial	2
Wohler Road	Local	2
Windsor River Road	Secondary Arterial	2
Mark West Springs Road	Primary Arterial	2
Fulton Road	Primary Arterial	2
Arata Lane	Major Collector	2

SOURCE: Crane Transportation Group, 1991.

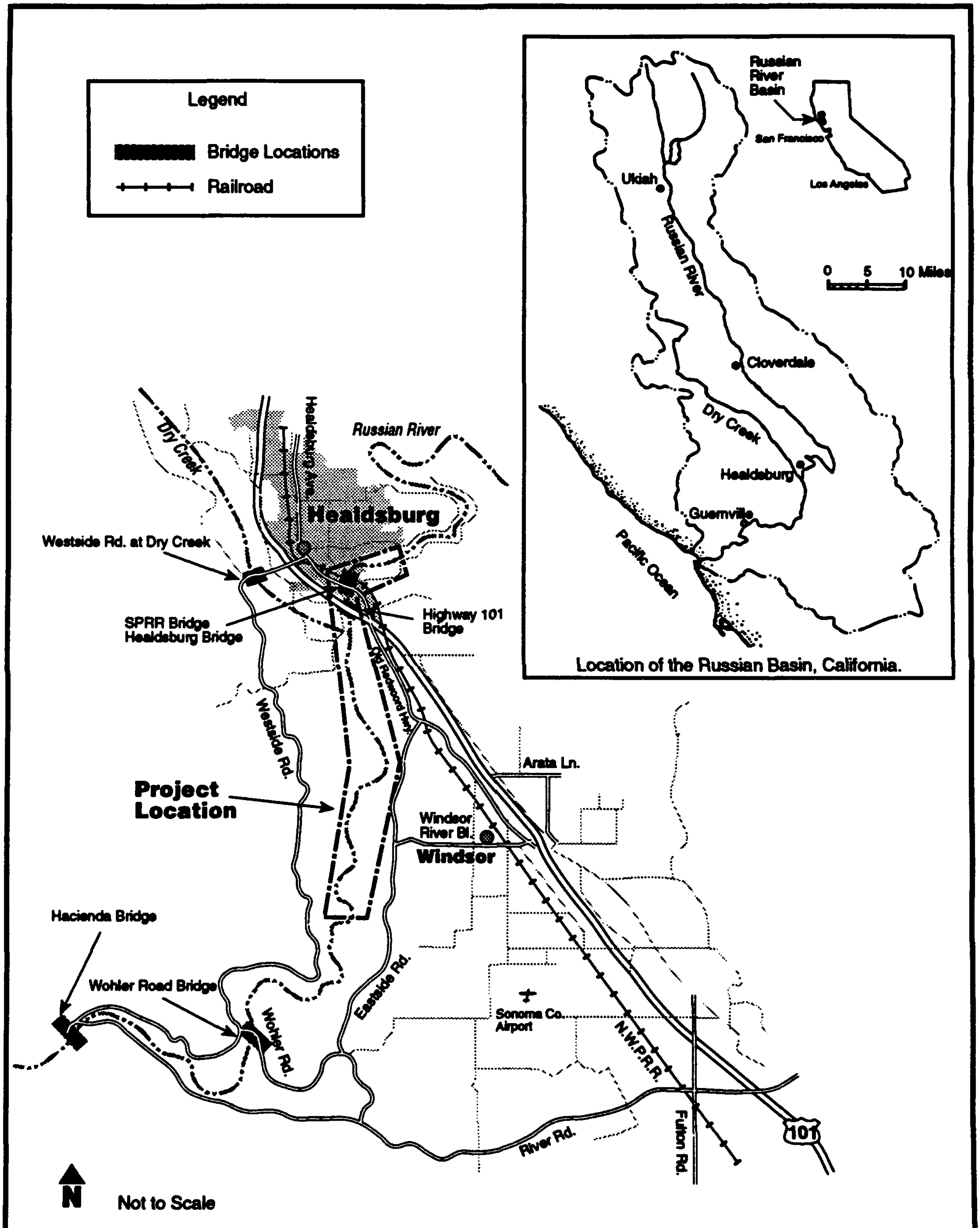


Figure 4.12-1
Major Roadways

Existing Volumes

The Crane Transportation Group recently completed a study of countywide traffic conditions and the effects of truck traffic generated by the aggregate mining and processing industry on those conditions.[1] To determine existing volumes, Crane Transportation Group conducted traffic counts, which were collected on an hourly basis from 6:00 AM to 7:00 PM at 28 locations throughout Sonoma County.

According to the study, gravel trucks use the roadway system from approximately 6:00 AM to 4:00 PM. Truck traffic is at or near maximum levels during the AM commute period of 7:00 to 9:00. Conversely, truck traffic is at minimal levels during the PM commute period (4:00 P.M. to 6:00 P.M.).

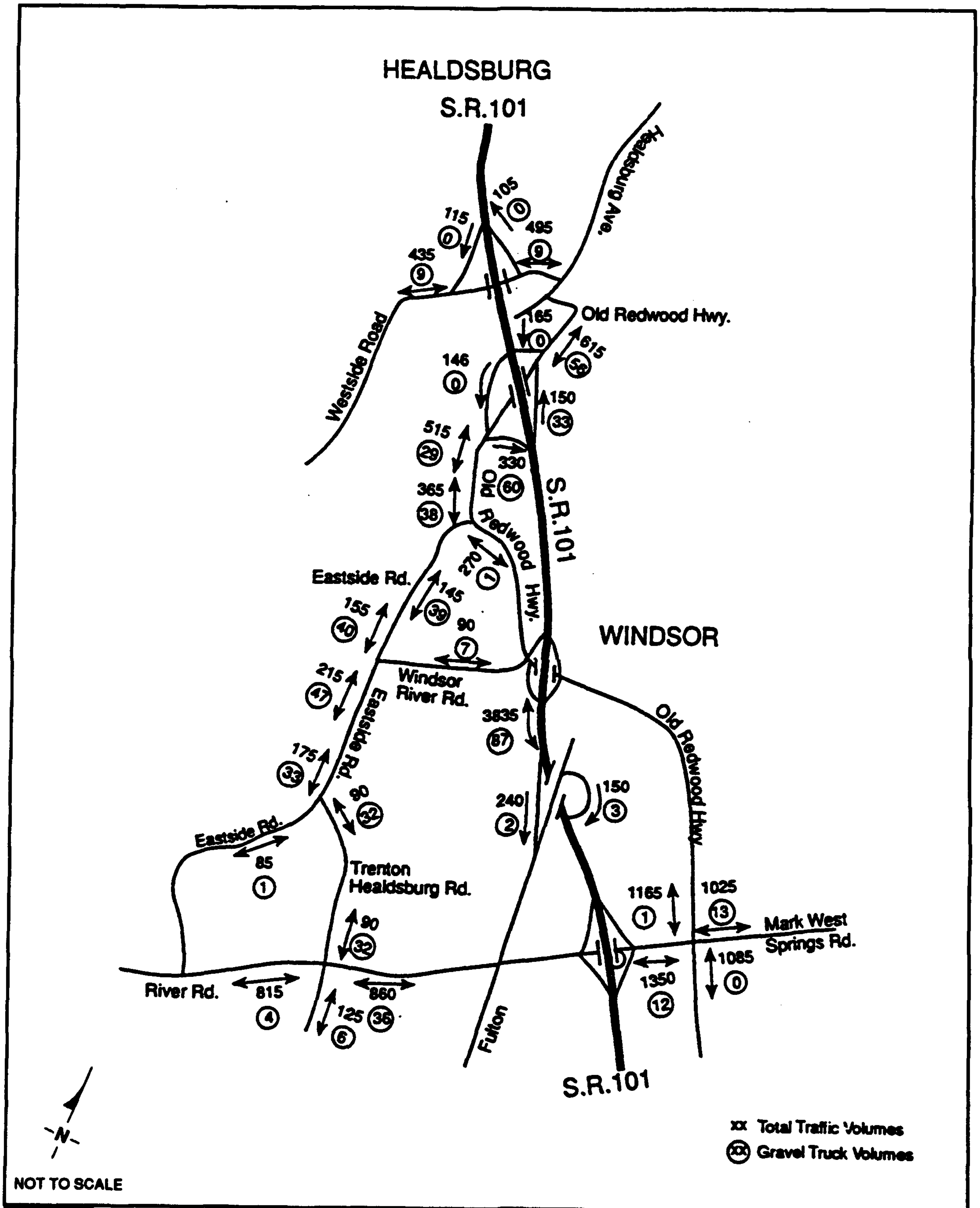
Between Healdsburg and Santa Rosa, Highway 101 experiences the greatest gravel truck traffic due to its proximity to urban centers. According to Crane Transportation Group, approximately 90 two-way vehicles travel Highway 101 during the AM peak traffic hour. Maximum AM peak hour traffic on other county roads between Healdsburg and Santa Rosa are shown in Table 4.12-2 and Figure 4.12-2.

TABLE 4.12-2
MAXIMUM AM PEAK HOUR (7:00-9:00)
TRUCK TRAFFIC

Road	Number of Trucks
Highway 101	90
Eastside Road - various segments	39-47
Trenton-Healdsburg Road	36
River Road east of Trenton-Healdsburg Road	34
Healdsburg Avenue north of Highway 101 in Healdsburg	56
Old Redwood Highway between Highway 101 and Eastside Road	38

Roadway Capacity

To analyze the capacities of existing non-freeway gravel truck routes, the "Mid Roads" methodology, previously developed for Sonoma County based on procedures and methodology



SOURCE: Crane Transportation Group.

Figure 4.12-2
AM Peak Hour Volumes October 1991
Sonoma County Central Area

from the Highway Capacity Manual (HCM), and the County's General Plan Circulation Element were used. The Mid Roads technique generates roadway service volumes adjusted to incorporate factors that influence roadway capacity. These volumes are then compared to existing roadway volumes to determine a level of service (LOS). Level of service describes traffic flow conditions and varies qualitatively from LOS A to LOS F as described in Table 4.12-3.

The General Plan used similar techniques; however, only uniform capacities for each major type of roadway are presented. Unlike the Mid Roads methodology, specific characteristics of individual roadway segments are not incorporated into the General Plan's overall capacity determination.

The results of the study, based upon both methodologies, conclude all analyzed roadway segments in the project area are operating at LOS A (see Table 4.12-4).

Roadway Safety

Roadway safety is determined from several factors, including existing volume levels, narrow roadway width, lack of shoulders, poor pavement conditions, grades and curvature. Based on a study conducted by EIP Associates, safety concerns exist at intersections where slow-moving trucks must turn onto high speed roadways.

Truck Accidents

To determine the number of accidents associated with gravel operations, roadways with large volumes of gravel truck movement, such as Eastside Road, Trenton-Healdsburg Road and Old Redwood Highway, were studied. These roadways typically experience from 300 to 600 or more gravel trucks each weekday. However, 0 to 2 accidents have been the average rate per year. Overall there have been no accidents for the majority of the years studied. According to Caltrans, road segments approximately one mile in length with more than 12 truck accidents per million truck miles travelled are classified as having relatively high frequencies for truck accidents. Based on current conditions, it does not appear accidents associated with gravel trucks are a significant problem in the study area.

City and County General Plan and Policies

Sonoma County General Plan

According to the Sonoma County General Plan regarding the Healdsburg and Environs Planning Area, "Gravel trucks associated with mining along the Russian River will continue to impact several roadways." The Plan then goes on to state, "West Street (now called Healdsburg Avenue) in Healdsburg, Highway 101 south of Windsor River Road, and road segments in Central Windsor are expected to be moderately congested and operate below LOS C." The following is the only policy that specifically addresses gravel truck travel in the General Plan:

TABLE 4.12-3

LEVEL OF SERVICE DEFINITION
SIGNALIZED INTERSECTIONS

Level of Service	Volume to Capacity Ratio	Typical Delay (Seconds/ Vehicle)	Typical Traffic Condition
A	0.00 - 0.60	$\leq$ 5.0	**Insignificant Delays:** No approach phase is fully utilized and no vehicle waits longer than one red indication.
B	0.61 - 0.70	5.1 - 15.0	**Minimal Delays:** An occasional approach phase is fully utilized. Drivers begin to feel restricted.
C	0.71 - 0.80	15.1 - 25.0	**Acceptable Delays:** Major approach phase may become fully utilized. Most drivers feel somewhat restricted.
D	0.81 - 0.90	25.1 - 40.0	**Tolerable Delays:** Drivers may wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.
E	0.91 - 1.00	40.1 - 60.0	**Significant Delays:** Volumes approaching capacity. Vehicles may wait through several signal cycles and long queues of vehicles form upstream.
F	N.A.	$\geq$ 60.0	**Excessive Delays:** Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.

SOURCES: Highway Capacity Manual, Highway Research Board, Special Report No. 87, Washington, D.C., 1965; *Interim Materials on Highway Capacity*, Circular 212, Transportation Research Board, 1980; Korve Engineering.

TABLE 4.12-4
DIRECTIONAL VOLUMES AND CAPACITIES
AM PEAK HOUR - OCTOBER 1991

Road segment	Peak Traffic Direction	Peak Direction Hourly Volumes		Midroads Directional Capacity at LOS D/E	County General Plan Directional Capacity LOS D/E*
		Total Traffic	Gravel Trucks		
Westside Road just west of S.R. 101	Westbound	223	6	1000	450
Healdsburg Avenue north of S.R. 101	Southbound	384	24	750	1010
Old Redwood Highway south of 101 (Healdsburg)	Southbound	306	30	915	1010
Old Redwood Highway north of Eastside Road	Northbound	195	30	835	780
Old Redwood Highway south of Eastside Road	Northbound	153	2	965	780
Eastside Road south of Old Redwood Highway	Northbound	80	30	835	780
Eastside Road south of Windsor River Road	Northbound	129	31	580	780
Trenton-Healdsburg south of Eastside Road	Northbound	60	27	305	400
River Road West of Trenton-Healdsburg	Eastbound	599	3	1185	1010
River Road East of Trenton-Healdsburg	Eastbound	608	9	1135	1010
Mark West Springs Road east of Old Redwood Highway	Westbound	651	1	795	1010

- General Plan Capacity for rural roads with good geometrics is 1200 vehicles per lane per hour at LOS D/E breakpoint. No capacity estimates are provided in the General Plan for rural roadways with less than "good geometrics". Values in table are best estimates by Crane Transportation Group.

SOURCE: Crane Transportation Group, 1991

> CT-7b Study and choose an alternative route for gravel trucks. Encourage trucks transporting gravel from Eastside Road to use this route rather than Windsor River Road through downtown Windsor.

There are no County ordinances that preclude a legal truck from driving on a legal road. Load limits are imposed by ordinance for all bridges.

None of the alternatives propose the use of Eastside Road or Windsor Road at this time. All gravel truck activity would occur on the private haul road owned by Syar. However, under the proposed project, the possibility exists for the Doyle site to transport aggregate to the Healdsburg site in the future. If this should occur, gravel trucks would use River Road.

Healdsburg General Plan

The Healdsburg General Plan does not specifically address gravel truck travel. However, the General Plan does include policies dealing with road and street development fees for new development, industrial included. Policy 8 of the Transportation Element states:

> The City shall continue to assess a road and street development fee on all new commercial, industrial, and residential development sufficient to fund systemwide capacity improvements. The road and street development fee schedule shall be periodically reviewed and revised as necessary.

None of the alternatives propose to use any public roadways in the City of Healdsburg. Syar's private haul road would be used to transport aggregate to the processing plant.

Aggregate Resources Management (ARM) Plan (1980)

The project lies within the Middle Reach study area of the ARM Plan. This consists of the area along the Russian River extending from Wohler to the Riverbend site. The ARM Plan includes a Circulation Plan which describes the preferred routes for individual operations and extraction areas. For the Middle Reach area, the following policies would apply to the Doyle site. Other project sites that involve instream mining in the Middle Reach are not addressed in the Circulation Plan. It should be noted, the Draft ARM Plan may address instream mining in the Middle Reach. However, this plan has not been adopted. Therefore, the existing ARM Plan is still the official document.

> Access to and from extraction and processing sites and haul routes within the designated terrace area is preferred as follows:
>
> 1. For the Basalt-Healdsburg pit, the levee/road along the west bank of the Russian River is preferred, provided that the Dry Creek crossing meets the requirements of the County Surface Mining Ordinance, the Water Quality Control Board, Sonoma County Water Agency and California Department of Fish and Game.
>
> 2. For Quarry Products, Inc., Basalt-Doyle Pit, and Kaiser Sand and Gravel, a route should be developed which parallel the River channel along the eastern side. The proposed route

should be included as a part of the Reclamation Plans submitted for the three terrace operations. The haul road would result in reduced traffic on Eastside Road.

The Doyle site has the only terrace mining operation under Alternatives 2 through 4. Terrace mining is proposed under Alternative 5, also. None of the alternatives would involve the use of any public road for gravel truck travel at this time. However, should excavation occur beneath the existing processing plant on the Doyle site, gravel trucks would need to use Eastside Road in order to process material at the Healdsburg site.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this EIR/EIS, impacts are considered significant if one or more of the following conditions would result from implementation of any of the alternatives.

- LOS C exceeded on public roadways.
- Vehicle trips added to roadways that currently operate at LOS D or worse.

Method of Analysis

By using existing information, this analysis provides a qualitative discussion of traffic impacts. Traffic volumes and level of service data were obtained from Crane Transportation Group, via the Draft EIR for the Sonoma County Aggregate Resources Management Plan Update.

For purposes of this analysis, project-generated truck traffic between proposed mining sites and the Healdsburg and Doyle processing plants are assessed to determine its potential for significant impact using the criteria listed above. Additionally, trips generated as a result of the importation of materials for the construction of spurs at the Healdsburg site (under Alternative 2) are evaluated. The export of materials from the processing plants to areas of use are not evaluated in this EIR/EIS because the plants are already permitted uses and not subject to regulation or restriction under the pending actions associated with this EIR/EIS.

Project Impact

4.12-1 Implementation of one of the alternatives would increase gravel truck traffic on roadways.

A-1 Under the No Project Alternative, gravel operations in the Russian River channel and low terraces would cease. Therefore, gravel truck travel in the vicinity of the project site, particularly along the private haul road and Westside Road, would decrease. However, it must be assumed under this alternative that aggregate would have to be transported from other parts of the county in order to meet market demand or that greater production from other sources (Quarry mining) would be required. In either case, gravel truck traffic

would increase on county roads outside the project area. Although the roadways currently experiencing the maximum levels of gravel truck traffic in the project vicinity are operating at LOS A, other regional roadways are operating at or near unacceptable levels of service. For example, Highway 101 is currently operating at LOS E near the Marin County line, at LOS C just south of Highway 116 in Cotati, and at LOS E or F through Santa Rosa.[2] This is considered a ***potentially significant impact.***

A-2 This alternative would generate, in the worst-case scenario with two sites in operation, 400 trips per day during the mining season. In addition, approximately 250 to 400 truckloads of rip-rap for the construction of proposed spurs would be imported to the project site from the Santa Rosa area, but only during one season. Trucks for this purpose would exit Highway 101 onto Redwood Road and travel to the Syar processing plant. Toward the end of proposed operations at the Doyle site, the existing processing facilities would be removed and the area beneath them excavated. Excavated materials would be transported on Eastside Road for processing at Syar's Healdsburg processing plant. This will add approximately 200 trip ends to the existing traffic.

All roadways in the study area are currently operating at LOS A. It is not anticipated that the increase from any of the proposed operations would cause service levels to exceed LOS C, which is the County's threshold of significance. Therefore, this is considered a ***less-than-significant impact.***

A-3 and A-4

Alternatives 3 and 4 would allow skimming of selected gravel bars identified in the vested rights reclamation plans, and prohibit excavation in the low flow channel. This alternative would involve equal or reduced gravel extraction compared to Alternatives 2 and 5 and no change in the proposed transport routes. Also, under Alternatives 3 and 4, no spur construction is proposed. Impacts related to increased truck travel are considered ***less than significant.***

A-5 This alternative eliminates instream mining and would remove gravel from the terraces adjacent to the river. Initially, it has been assumed this alternative would extract a volume comparable to that of the proposed project and that transport of all materials would occur on private haul roads. No spur construction is proposed as part of this alternative. This is considered a ***less-than-significant impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce this impact to a *less-than-significant level.*

4.12-1 *Sonoma County shall implement an updated Aggregate Resources Management Plan that effectively relies on production of aggregate from sources other than the Middle Reach*

of the Russian River, which would help reduce existing and anticipated traffic volumes within the County. This is required for Alternative 1, the No Project Alternative.

Failure for the County to do so would result in nonmitigation of the above impact and the impact would, therefore, be considered significant and unavoidable.

<u>Cumulative Impacts</u>

4.12-2 Implementation of one of the alternatives could add to increasing congestion on regional roadways.

A-1 As discussed above, the No Project Alternative could result in haul trucks using regional roadways that are at or near unacceptable levels of service. As cumulative traffic increases, the additional gravel trucks would exacerbate low service levels. Therefore, this is a potentially ***significant impact.***

A-2 through A-5

Under these alternatives, regional roadways would not be used; therefore, truck traffic would not contribute to substantial increases throughout the region. This is considered a ***less-than-significant impact.***

<u>Mitigation Measure</u>

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.* It should be noted that the No Project Alternative's contribution to the service levels in some areas would continue to be unacceptable due to non-mining-related traffic.

4.12-2 *Implement Mitigation Measure 4.12-1. This measure would be required for Alternative 1.*

ENDNOTES

1. Crane Transportation Group. *Technical Report for the Sonoma County Aggregate Resources Management Plan and EIR*. October 1991.

2. Ibid.

4.13 CLIMATE AND AIR QUALITY

4.13 AIR QUALITY

INTRODUCTION

This section of the Draft EIR/EIS evaluates the potential impacts on air quality resulting from the proposed reclamation plans for aggregate mining and associated mining activities in and adjacent to the Russian River. Where appropriate, mitigation measures are suggested that could minimize or eliminate potential air quality impacts.

SETTING

Climate

Geography plays a significant role in weather patterns throughout the Coastal Range, including the project vicinity. The Russian River Drainage Basin extends from the northern portion of Sonoma County into Mendocino County. The project site is bounded by the Mayacmas Mountains on the north and east and the Coastal Range on the west. These mountain ranges tend to buffer the Healdsburg area from the marine weather systems that originate over the Pacific and are drawn inland by the jet stream.

The climate of the vicinity is typically polarized between summer and winter seasons. The winter season is characterized by overcast days and lengthy periods of rain and drizzle. Winter temperatures range from an average low of 37°F to an average high of 62°F, with occasional overnight freezing temperatures. Annual precipitation averages 30 inches; 81 percent falls from November through March. Summer temperatures range from an average low of 48°F to an average high of 82°F, with temperatures in excess of 100°F occasionally.[1]

Existing Air Quality

Air Pollution Sources

Carbon Monoxide

Combustion of petroleum fuels is the principal source of carbon monoxide. Carbon monoxide tends to dissipate rapidly into the atmosphere, and consequently, violations of the CO standard are generally limited to major intersections during peak hour traffic conditions.

Ozone

Primary or direct pollutants are those pollutants that are emitted into the environment. Hydrocarbons and nitric oxides are primary pollutants generated by motor vehicle operation and emitted as exhaust. Secondary or indirect pollutants are pollutants formed in the atmosphere, usually as the result of a reaction involving primary pollutants. Ozone is a secondary pollutant, which forms as a result of the interaction of ultraviolet light, hydrocarbons (HCs), and nitric oxides (NO_x).

Ozone tends to be a highly reactive molecule which readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high hydrocarbon and NO_x levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Motor vehicles are a primary source of hydrocarbons and nitrogen oxides. Because of the direct link between vehicular emissions and ozone formation, air quality programs focus on reduction of mobile source emissions. Significant reductions have been achieved, most notably through the mandated state inspection program.

Particulate Matter

Concern about the health effects of breathing particulates resulted in revision of the state and federal Total Suspended Particulate (TSP) standards to reflect particulates that are small enough to be considered "inhalable", i.e., 10 microns or less in size. Current standards set levels for acceptable concentrations of particulates that are smaller than 10 microns in diameter, referred to as the PM_{10}. It should be noted that there is a wide discrepancy between the federal and state PM_{10} standards. Areas that are in violation of the more stringent state standard may be in compliance with federal standards.

Background Concentrations

A project-level analysis calculates the specific project impacts on nearby receptors. However, since the significance of the impact is determined by comparison to state and federal standards, the total pollutant concentration must be considered. This total concentration has both background and project-related components. The background component (ambient level) will include areawide mobile and stationary sources as well as contributions from nearby streets, intersections and parking facilities. Pollutants transported into the area from distant sources or emitted during earlier time periods may also add significantly to the background concentrations. Using the nearest air monitoring station's data as the background concentration is an estimation of the true ambient level. The only sufficiently accurate method of determining the background concentration is to measure the air pollutant level at the project site, which would require three consecutive years of monitoring.

Air Quality Monitoring Data

Data from area air sampling stations for carbon monoxide, ozone, and particulate matter are discussed here. The only standard that was exceeded at the Healdsburg station was the state's PM_{10} standard. The ozone and carbon monoxides were not exceeded.

For carbon monoxide, the air sampling station nearest to the project area is in Santa Rosa. The recorded CO concentrations at this station are presented in Table 4.13-1. The federal one-hour and eight-hour standards for CO were not exceeded between 1987 and 1989.

The nearest air sampling station that measures ozone is also located in Santa Rosa. A summary of the recorded values at this station is presented in Table 4.13-2. As shown, the one-hour ozone concentration reached 0.10 ppm. The one-hour federal and state standards were not exceeded.

The closest PM_{10} air sampling station is in Healdsburg. The limited amount of data that has been collected at this location is presented in Table 4.13-3. The recorded PM_{10} levels have exceeded the California 24-hour standards. The 1991 violations occurred in January and December.

It should be noted that there is a wide discrepancy between federal and state suspended particulate standards. Areas that are in violation of the more stringent state standard may be in compliance with federal standards.

Air Quality Sensitive Receptors

There are several areas sensitive to air pollutants in the vicinity of the proposed project site. Most of these are residential developments. Additionally, there are places, such as agriculture areas, churches, schools and the nearest right-of-way, to which the general public has continuous access. Air pollutants are able to inflict several types of adverse health effects as indicated in Table 4.13-4.

Regulatory Background

Federal Standards

The 1970 Clean Air Act gave the U.S. Environmental Protection Agency (EPA) the authority to set federal ambient air quality standards. The Act indicated the need for primary standards to protect public health and secondary standards to protect public welfare from visibility reduction, soiling, nuisance and similarly undesirable effects. It also required that the federal standards be designed to protect those people most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by illness, and persons engaged in

TABLE 4.13-1
SUMMARY OF RECORDED CO LEVELS IN SANTA ROSA (PPM)

Year	Hourly Concentration		8-Hour Mean		Recorded 8-Hour Concentration >9	
	1st High	2nd High	1st High	2nd High	Days	Hours
1989	9.0	8.0	6.1	5.0	0	0
1990	7.0	7.0	5.1	4.3	0	0
1991	6.0	6.0	4.0	3.8	0	0

SOURCE: California Air Quality Data Summaries 1989, 1990, and 1991, CARB.

TABLE 4.13-2
ANNUAL STATISTICS - OZONE LEVELS MEASURED AT THE SANTA ROSA SAMPLING STATION (PPM)

Year	Hourly Concentration		Annual Mean		No. of Hourly Concentration >9	
	1st High	2nd High	All Hours	Daily Max	Days	Hours
1989*	.09	.08	.015	.031	0	0
1990	.07	.07	.016	.033	0	0
1991	.09	.08	.018	.033	0	0

* Data are valid, but incomplete, as insufficient number of points were collected to meet EPA and/or CARB criteria.
SOURCE: California Air Quality Data Summaries 1989, 1990, and 1991, CARB.

TABLE 4.13-3
ANNUAL STATISTICS - PM_{10} LEVELS MEASURED AT THE HEALDSBURG MONITORING STATION (UB/M^3)

Year	24 Hour Concentration		Annual Mean		Number of Samples		
	High	Low	Geometric	Arithmetic	> 50	> 100	> 150
1990	57	0	16.7	20.5	2	0	0
1991*	72	4	19.1	22.9	3	0	0
1992*	42	NC	NC	NC	0	0	0

*Data are valid, but incomplete, as insufficient number of points were collected to meet EPA and/or CARB criteria.
SOURCE: California Air Quality Data Summaries 1990, 1991, and 1992, CARB.

TABLE 4.13-4

HEALTH EFFECTS SUMMARY OF THE MAJOR CRITERIA AIR POLLUTANTS

Air Pollutant	Adverse Effects
Ozone	• eye irritation • respiratory function impairment
Carbon Monoxide	• impairment of oxygen transport in the bloodstream • aggravation of cardiovascular disease • impairment of central nervous system function • fatigue, headache, confusion, dizziness • can be fatal in the case of very high concentrations in enclosed places
Sulfur Dioxide	• aggravation of chronic obstructive lung disease • increased risk of acute and chronic respiratory disease
Nitrogen Dioxide	• risk of acute and chronic respiratory disease
Suspended Particulates	• increased risk of chronic respiratory disease with long exposure • altered lung function in children • with SO_2, may produce acute illness • particulate matter 10 microns or less in size (PM_{10}), may lodge in and/or irritate the lungs

SOURCE: Bar Area Air Quality Management District, 1985.

strenuous work or exercise (all termed "sensitive receptors"). Pollutants subject to federal ambient standards are referred to as "criteria pollutants", because the EPA publishes criteria documents to justify the choice of standards.

Currently, most of the effort to improve air quality in the United States is directed toward the control of five criteria pollutants: photochemical oxidants (ozone), CO, PM_{10}, NO_2, and sulfur dioxide (SO_2). Fifteen years ago, suspended particulate lead would have been included in this list, but today the widespread availability and use of unleaded gasoline has effectively eliminated lead as an air quality concern. Federal and state standards are presented in Table 4.13-5. The standards provide acceptable durations for specific federal and state pollutant levels in order to protect sensitive receptors from the adverse health effects described in Table 4.13-4.

The 1977 Clean Air Act Amendments (passed after many states failed to meet the five-year deadline for achieving the federal standards) required that each state identify areas within its borders that did not meet federal primary standards. Such zones have been designated non-attainment areas and are required to devise a State Implementation Plan (SIP), subject to EPA approval, which would guarantee attainment no later than the end of 1987. The Clean Air Act Amendments did not specify what course of action would be undertaken by the EPA if states failed to meet the 1987 attainment deadline. Many options are open to the EPA, ranging from the imposition of sanctions on the non-attainment areas (e.g., prohibiting the construction of major air pollution sources, or withholding federal funds for transportation and sewage treatment projects) to ignoring the standard violations and waiting for Congress to amend the Clean Air Act.

Between 1987 and 1990, many states, including California, were in the process of implementing the EPA's interim policy. Non-attainment areas were given until the end of 1990 to revise their SIPs to demonstrate attainment and maintenance. After submittal of the revised SIPs, the EPA classified non-attainment areas as near-term (i.e., attainment predicted in three to five years) or long-term (i.e., attainment more than five years away). Sanctions made against the construction of major air pollutant sources in long-term non-attainment areas will take effect three to five years from SIP submittal (i.e., 1995-1996). In near-term non-attainment areas, pollutant emission reductions of three percent per year were to occur until standards are attained, and standard maintenance for a period of ten years thereafter will have to be demonstrated.

The Clean Air Act of 1990 requires emission controls on factories, businesses and automobiles. The Act affects automobiles by lowering the limits on HC and NO_x emissions, requiring the "phasing-in" of alternative-fuel cars, requiring on-board canisters to capture vapors during refueling and extending emission-control warranties. The Act reduces airborne toxins by requiring factories to install "maximum achievable control technology" and installing urban pollution control programs. The Act reduces acid rain production by cutting sulfur dioxide emissions for coal-burning power plants.[2]

TABLE 4.13-5
FEDERAL AND STATE AMBIENT AIR QUALITY STANDARDS[3]

Pollutant	Averaging Time	California Standard[1]	Federal Standards[2] Primary[4]	Federal Standards[2] Secondary[5]
Ozone	1-hour	0.09 ppm (180 ug/m^3)	0.12 ppm (235 ug/m^3)	0.12 ppm (235 ug/m^3)
Carbon Monoxide	1-hour	20.00 ppm (23 mg/m^3)	35.00 ppm (40 mg/m^3)	35.00 ppm (40 mg/m^3)
	8-hour	9.00 ppm (10 mg/m^3)	9.00 ppm (10 mg/m^3)	9.00 ppm (10 mg/m^3)
Nitrogen Dioxide	1-hour	0.25 ppm (470 mg/m^3)	— —	— —
	Annual Average	— —	0.053 ppm (100 ug/m^3)	0.053 (100 mg/m^3)
Sulfur Dioxide	1-hour	0.25 ppm (655 mg/m^3)	— —	— —
	3-hour	— —	—	1300 ug/m^3 (0.5 ppm)
	24-hour	0.05 ppm[6] (131 ug/m^3)	365 ug/m^3 (0.14 ppm)	— —
	Annual Average	— —	80 ug/m^3 (0.03 ppm)	— —
Suspended Particulate Matter (PM_{10})	24-hour	50 ug/m^3	150 ug/m^3	150 ug/m^3
	Annual Geometric Mean	30 ug/m^3	—	—
	Annual Arithmetic Mean	—	50 ug/m^3	50 ug/m^3
Sulfates	24-hour	25 ug/m^3	—	—
Lead	30 Day Average	1.5 ug/m^3	—	—
	Calendar Quarter	—	1.5 ug/m^3	1.5 ug/m^3
Hydrogen Sulfide	1-hour	0.03 ppm (42 ug/m^3)	— —	— —
Vinyl Chloride	24-hour	0.010 ppm (26 ug/m^3)	— —	— —
Visibility[7] Reducing Particles	1 Observation	Visibility < 10 miles	—	—

SOURCE: California Air Resources Board, 1989.

NOTES:

1. California standards for ozone, carbon monoxide, sulfur dioxide (1 hr), nitrogen dioxide, and particulate matter - PM_{10}, are values that are not to be exceeded. The sulfates, lead, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates standards are not to be equaled or exceeded.
2. National standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentration above the standard is equal to or less than one.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the Environmental Protection Agency.
5. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by the EPA.
6. At locations where the state standards for ozone and/or suspended particulate matter are violated. National standards apply elsewhere.
7. Prevailing visibility is defined as the greatest visibility that is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors.

California Standards

The California Air Resources Board (CARB) coordinates and oversees both state and federal air pollution control programs. The CARB monitors existing air quality, establishes state standards, limits allowable emissions from vehicular sources, and is responsible for preparing a State Implementation Plan to attain federal primary standards. The CARB has divided the state into many single and multi-county air basins. Authority for air quality management within the air basins has been given to local Air Pollution Control Districts (APCD).

Until recently, there was no specific deadline for the attainment of state standards. However, the 1988 California Clean Air Act requires a vigorous effort toward attainment of state air quality standards, which in many cases (e.g., ozone) are more strict than the federal standards. Non-attainment areas within the state must develop a comprehensive plan to attain federal and state air quality standards. Using 1987 as the base year, these plans must demonstrate the potential to achieve at least a five percent annual reduction in pollutant precursors until compliance with state standards has been achieved. The APCD must apply reasonably available control technology on all existing emission sources and adopt reasonably available transportation control measures. The CARB is required to adopt rules to control emissions from consumer solvents and to tighten controls on emissions from mobile sources. These rules and controls will likely affect conditions and requirements placed on the proposed project. The District deadline for update of the Attainment Plan was June 30, 1991, and every three years thereafter.

Northern Sonoma County Air Pollution Control District Standards

The project is located in the northern portion of Sonoma County, which falls within the North Coast Air Basin along with Del Norte, Humboldt, Trinity, and Mendocino Counties. The project site lies within the jurisdiction of the Northern Sonoma County Air Pollution Control District (APCD). The APCD has significance criteria of 15 tons per year for PM_{10} and 25 tons per year for TSP.

Pursuant to Clean Air Act requirements, all areas of California have been classified by attainment status with regard to the National Ambient Air Quality Standards. Northern Sonoma County was designated a non-attainment area for particulate matter less than 10 microns.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

Air quality emissions are considered significant for cumulative impacts if the state or federal ambient air quality standards presented in Table 4.13-5 are exceeded. Project impacts are considered significant if there are annual PM_{10} emissions of 15 tons or greater. For TSP, annual emissions of 25 tons or greater are considered significant.

Method of Analysis

Project total organic gases (TOG), NO_x, TSP, and PM_{10} impacts were calculated from the analysis of mining aggregate, transporting the materials for the construction of the five spurs, and haul road emissions. Particulate and CO emissions would be produced from prescribed burning of the riparian habitat. Calculation of pollutant produced by the burning cannot be made because the mass of the fuel is not known. Prescribed burns can produce approximately 10 grams of PM_{10} per kilogram of mass burned and 75 grams of CO per kilogram of mass burned. The emissions associated with processing aggregate and the erosion of the storage piles are not evaluated in this EIR/EIS because they are associated with the processing plant, which is permitted separate from this project.

Calculations of mining particulate emissions were made by multiplying the EPA emission factors (provided by North Sonoma County APCD[3]) by the annual tons per year proposed for removal, as presented in Table 3-3, Summary of Proposed Mining Operations. The resulting emission factor (pounds emitted per tons of aggregate handled) is then multiplied by a wet handling factor and converted into tons. PM_{10} emissions from the aggregate mining operations would be 0.0224 pounds per ton of aggregate handled with an additional 87.5% wet handling control efficiency. TSP emissions from the aggregate mining operations would be 0.28 pounds per ton of aggregate handled multiplied by the same wet suppression efficiency. There are no TOG or NO_x emissions associated with mining aggregate.

Calculations of estimated transportation emissions were made using the same methodology used to calculate the aggregate transported under Alternative 1, with 250 round trips between Santa Rosa and Healdsburg. The amount of aggregate needed was assumed to be the same as the amount produced by the proposed project: 56,833 truck trips. This is assuming that the trucks would be traveling 16 miles. Actual trip distance could be greater. At this time, the location of the No Project Alternative aggregate is unknown. California heavy duty diesel truck EMFAC7E emission factors were used in the calculation of 250 round trips between Santa Rosa and Healdsburg.[4] An average speed of 45 miles per hour and a travel distance of 16 miles were assumed.

For Alternative 2, additional PM_{10}, TOG and NO_x emission calculations were made for transportation of the materials for the construction of the five spurs along the north and west bends of the Healdsburg Bendway section of the Russian River.

Haul road PM_{10} and TSP calculations were made using AP-42 emission factors in accordance with John Laird of the North Sonoma APCD.[5] Several assumptions were made. These were 85% wet control efficiency for all vehicles except the water truck, 95% wet control efficiency for the water truck, 4.1% silt factor, 20 mph for the full scrapper and water truck, 35 mph for the empty scrapper, and 2 mph for the grader.

Haul road TOG and NO_x emissions were calculated for two different scenarios using emission factors for gasoline and diesel-powered heavy duty mobile construction equipment from AP-42.[6] The calculations assumed five scrapers, one water truck, and one motor grader for the first

scenario and five off-highway trucks, one front-end loader, one water truck, one motor grader, and one dragline for the second scenario.

Soiling occurs when equipment and/or vehicles churn dust into the air, causing dust to settle on nearby structures and objects, such as cars, windows, lawn furniture and laundry on outdoor lines. The extent of soiling on the nearby properties and people cannot be predicted at this time. Soiling would depend on many factors, such as distances from the haul road and mining operations, wind speed, wind direction, standard deviation of the wind direction, topographic features, and the exact number of dust-creating mining vehicles.

<u>Project Impact</u>

4.13-1 Mining and reclamation operations would cause increases in air pollutant emissions.

A-1 Aggregate operations would not occur under this alternative, so the sensitive receptors in and along the Russian River south of Healdsburg and in Healdsburg would not be affected. There would be an increase in heavy duty diesel truck traffic air pollution due to the aggregate being transported into and throughout the county. Estimated maximum annual emissions would be approximately 8.0 tons of PM_{10}, 4.2 tons of TOG, and 30.4 tons of NO_x. This does not take into account specific impacts at the point of extraction. This is considered a ***less-than-significant impact.***

A-2 Under the proposed project, aggregate mining, transportation of the materials for the construction of the five spurs, and transportation on the haul road would produce TSP, PM_{10}, TOG and NO_x emissions. Using the methods described above, emissions were calculated for the first five tentative seasons. The second year would produce the greatest emissions of the five years: a total of 40.1 tons of TSP, 11.0 tons of PM_{10}, 0.6 tons of TOG, and 11.9 tons of NO_x. Emissions would increase during the period that the area under the Doyle processing plant is excavated, as haul trucks would travel on Eastside Road to the Healdsburg processing plant (approximately 200 trips per day for an unknown period). Sensitive receptors near the Healdsburg Bendway and Riverbend sites would experience soiling of exterior areas. Only the second of the five years would produce significant levels of TSP. This is considered a ***significant impact.***

A-3 The aggregate mining would produce TSP, PM_{10}, TOG and NO_x emissions. Using the methods mentioned above, emissions were calculated for the first five tentative seasons. The second year produces the greatest emissions of the five years. A total of 34.4 tons of TSP, 9.5 tons of PM_{10}, 0.5 tons of TOG, and 9.9 tons of NO_x would be produced during the second year. The Gravel Bar Skimming Alternative would produce approximately ten to twenty percent less TOG, NO_x, PM_{10}, and TSP than proposed project. Emissions would increase during the period that the area under the Doyle processing plant is excavated, as haul trucks would travel on Eastside Road to the Healdsburg processing plant (approximately 200 trips per day for an unknown period). Sensitive receptors near the Healdsburg Bendway and Riverbend sites would experience

soiling of exterior areas. Only the second year of the five years would produce significant levels of TSP. This is considered a ***significant impact***.

A-4 The aggregate mining would produce TSP, PM_{10}, TOG, and NO_x emissions. Using the methods mentioned in the method of analysis section, emissions were calculated for the first five tentative seasons. Due to the limited amount of information, all five years were assumed to produce the same emissions. A total of approximately 21.7 tons of TSP, 5.7 tons of PM_{10}, 0.4 tons of TOG, and 7.2 tons of NO_x would be produced during each year. The Limited Gravel Bar Skimming Alternative would produce approximately thirty to thirty-five percent less TOG, NO_x, PM_{10}, and TSP than Alternative 3. Emissions would increase during the period that the area under the Doyle processing plant is excavated, as haul trucks would travel on Eastside Road to the Healdsburg processing plant (approximately 200 trips per day for an unknown period). This is considered a ***less-than-significant impact***.

A-5 The aggregate mining would produce TSP, PM_{10}, TOG, and NO_x emissions. Using the methods mentioned above, emissions were calculated for the first five tentative seasons. Due to the limited amount of information, all five years were assumed to produce the same emissions. A total of approximately 17.0 tons of TSP, 5.4 tons of PM_{10}, 0.5 tons of TOG, and 8.8 tons of NO_x would be produced during each year. The terrace alternative would produce approximately thirty to forty percent less TOG, NO_x, PM_{10}, and TSP than Alternative 2. This is considered a ***less-than-significant impact***.

<u>Mitigation Measures</u>

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant level*.

4.13-1(a) *The proponent shall schedule the South Levee Haul Road aggregate mining during three different years. One-quarter of the mining would occur during year 1 and the same for year 2. One-half of the mining would occur for year 5. This measure would be required for Alternative 2.*

The maximum amount of TSP produced with this mitigation measure would be 24.32 tons during years 1 and 2.

4.13-1(b) *The proponent shall schedule the South Levee Haul Road aggregate mining during two years, half during year 1 and half during year 2. This measure would be required for Alternative 3.*

The maximum amount of TSP produced with this measure would be 23.9 tons during the first two years.

Cumulative Impact

4.13-2 Air pollutant emissions related to reclamation and mining operations would have cumulative effects on local air quality conditions.

A-1 Aggregate operations would not occur. Sensitive receptors in and along the Russian River south of Healdsburg and in Healdsburg would not be significantly affected. There would be an increase in heavy duty diesel truck traffic air pollution due to the aggregate being transported into the county to fill the demand unmet by the project. Pollutant concentrations along the major highways would increase. However, because increased truck traffic could be expected to increase cumulative emissions, this is considered a ***potentially significant and unavoidable impact.***

A-2 The project-related aggregate mining, transportation of the materials for the construction of the five spurs, and transportation on the haul road could produce TSP, PM_{10}, TOG and NO_x concentrations in excess of state and/or federal standards. Sensitive receptors near the Healdsburg Bendway and Riverbend sites would experience soiling of exterior areas and possibly high concentrations of TOG and NO_x due to construction vehicles. When added to expected increases in cumulative emissions, this is considered a ***potentially significant and unavoidable impact.***

A-3 and A-4

The aggregate mining could produce TSP, PM_{10}, TOG and NO_x concentrations in excess of state and/or federal standards. Sensitive receptors near the Healdsburg Bendway and Riverbend sites would experience soiling of exterior areas. High concentrations of TOG and NO_x may be exacerbated by construction vehicles. This is considered a ***potentially significant and unavoidable impact.***

A-5 Prediction of the potential TOG, NO_x, PM_{10}, and TSP concentrations associated with this alternative would not be possible at this time due to the unknown amount of aggregate that would be mined. It is assumed that the amount would be similar to the proposed project. Therefore, this alternative would have similar emissions. This is considered a ***potentially significant and unavoidable impact.***

Mitigation Measures

Implementation of the following mitigation measure would reduce the above impacts, *but not to a less-than-significant level.*

4.13-2 *Unnecessary idling of construction equipment shall be avoided.*

ENDNOTES

1. Felton, Ernest L., 1965. *California's Many Climates*. Pacific Books, Publishers, Palo Alto, California.

2. Beamish, Rita, 1990. *Bush fulfills campaign pledge, signs strict anti-pollution law*. Associated Press, Sacramento Bee, November 16.

3. Telephone conversation with John Laird of the North Sonoma County Air Pollution Control District on November 26, 1991 on the particulate emissions factors and wet control efficiency.

4. California Air Resources Board, 1990a. *EMFAC7E Emission Factors and EF7E Factors/ B7C Draft Trends/Fuel, Year: 1991*. Emission Inventory Branch, Sacramento.

5. EPA, 1988. *AP-42, Supplement B to Compilation of Air Pollutant Emission Factors Volume I: Stationary Point and Area Sources*. Section 11.2.1. September.

6. EPA, 1985. *AP-42, Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources*.

4.14 NOISE

4.14 NOISE

INTRODUCTION

This section discusses noise issues related to the proposed reclamation plans for aggregate mining in and adjacent to the Russian River.

SETTING

Acoustic Fundamentals

Sound is a mechanical form of radiant energy which is transmitted by pressure waves in the air. It is characterized by two parameters: amplitude and frequency.

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic rather than a linear scale. As a consequence, the pressure difference in a 10 dB sound is 10 times that of a 0 Db sound, a 20 dB sound is 100 times the pressure difference, a 30 dB sound 1,000 times, and so on. Another feature of the decibel scale is the way in which sound amplitudes from multiple sources add. A 65 dB point source of sound, say a truck, when joined by another similar source results in a sound amplitude of 68 dB, not 130 dB, that is to say that doubling the source strength increases the sound pressure by 3 dB. Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish 3 dB change in amplitude as the minimum audible difference for the average person.[1]

Frequency is the number of fluctuations of the pressure wave per second. The unit of frequency is the Hertz (abbreviated Hz; one Hz equals one cycle per second). The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 0 dBA to about 140 dBA.

The human response to environmental noise is subjective and varies considerably from individual to individual. The effects of noise can range from interference with sleep, concentration, and communication, to physiological and psychological stress, and, at the highest intensity levels, to

hearing loss. Listed in Table 4.14-1 are several examples of the noise levels associated with common situations.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are used. The three most commonly used are L_{eq}, L_{dn}, and CNEL. The energy equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period of time. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10 dBA "penalty" added for nighttime noise (10:00 PM to 7:00 AM) to account for the greater sensitivity to noise during this period.[2] CNEL, the community equivalent noise level, is similar to L_{dn}, but adds a 5 dBA penalty to evening noise (7:00 PM to 10:00 PM). In situations where motor vehicles are the dominant source of noise, a useful rule of thumb for relating these three descriptors is to remember that the L_{eq} for the peak commute hour is usually within one decibel of the L_{dn} and CNEL.[3]

In addition, the L_{50} descriptor is sometimes used. The L_{50} represents the noise level where 50 percent of the time the noise levels will be higher than this value, and 50 percent of the time noise levels will be lower.

Existing Noise Environment

Existing Noise Sources

The proposed sites in and along the Russian River are mostly characterized as "quiet". The noise levels at the North Levee, Healdsburg Bendway and Riverbend sites are greatly influenced by vehicular traffic, train, industrial and residential noise sources. The "quiet" sites are influenced also by other noise sources, such as airplanes, and agriculture equipment.

One of the important noise sources contributing to the existing noise environment is motor vehicle traffic. Highway 101 is a four-lane freeway road northeast of the Doyle, South Levee Haul Road, Middle Reach, and North Levee sites and southwest of the Healdsburg Bendway and Riverbend sites. Highway 101 is within a mile of the Middle Reach, North Levee, Healdsburg Bendway and Riverbend sites. There are three major arterials in the area that carry low volumes of traffic. These roads are Westside Road, Eastside Road and Old Redwood Highway. Additional traffic noise is generated on the arterials in Healdsburg.

Railroad noise in the Healdsburg area is created by the Northwestern Pacific Railroad, which roughly parallels Old Redwood Highway and Highway 101. The railroad tracks are just south of the Healdsburg Bendway site. According to Northwestern Pacific Railroad[4] and Sonoma County[5], two trains use those tracks everyday at anytime of the day. The 55 L_{dn} noise contour for the Northern Pacific Railroad would occur between 150 feet to 500 feet from the tracks depending on when the trains pass.[6]

Aircraft noise in the project area is generated by flight operations at the Sonoma County Airport. The Sonoma County Airport is the busiest airport in Sonoma County and is approximately three

TABLE 4.14-1

TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND IN THE INDUSTRY

A-Weighted At a Given Distance From Noise Source	Sound Level in Decibels	Noise Environments	Subjective Impression
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Pile Driver (50') Ambulance Siren (100')	100		Very Loud
	90	Boiler Room Printing Press Plant	
Freight Cars (50') Pneumatic Drill (50')	80	In Kitchen with Garbage Disposal Running	
	70		Moderately Loud
Vacuum Cleaner (10') Department Store	60	Data Processing Center	
Light Traffic (100') Large Transformer (200')	50	Private Business Office	
	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Source: *Handbook of Noise Measurement*, Arnold P. G. Peterson and Ervin E. Gross, Jr., 1963.

miles to the southeast of the Doyle site. The Healdsburg City Airport is northwest of the City, and is 3.75 miles northwest of the Healdsburg Bendway site.

Agricultural uses are still prevalent adjacent to the proposed Doyle, South Levee Haul Road, Middle Reach, and North Levee sites. There are many vineyards on both sides of the Russian River south of Healdsburg.

There are several industrial noise sources in the area. Several lumber operations are in and near Healdsburg. Also along the Russian River, aggregate is being mined from terrace areas that are not part of the proposed project.

Residential noise sources include, but are not limited to, vacuum cleaners, garbage disposals, lawn mowers, leaf blowers, televisions, radios, stereos and dogs.

Noise Sensitive Receptors

There are many areas sensitive to noise in the vicinity of the project site. Most of the sensitive receptors are located in Healdsburg (see Figure 4.14-1). The bluff along the Healdsburg Bendway contains several homes and a trailer park with views of the Bendway and Riverbend sites. An adult community is located north of the Riverbend site. At least one home in this development has line-of-sight access to the river. There are a few homes along the west side of the river, although none of these has visual access. Residences are sensitive to both indoor and outdoor noise levels 24-hours per day. A park is located just north of the Memorial Bridge, and several homes and developments along the Bendway and Riverbend sites have access to the river via paths. There are several schools in Healdsburg, including a middle and high school. The schools are sensitive to indoor and outdoor noise levels primarily during the day.

Monitored Existing Noise Levels

Noise levels were monitored at two locations in Healdsburg on Monday, October 7, 1991. Noise levels were measured using a Quest Electronics M-28 Noise Logging Dosimeter (S/N GX9010009) and a Quest Electronics C-12B Permissible Sound Calibrator (S/N V0050195). Measurements were performed by EIP. The monitoring locations were close to the Russian River, the Healdsburg Bendway and Riverbend sites, and the Syar processing plant. The Syar processing plant was operating at a low level at the time of monitoring.

The first noise monitoring location was at the corner of Second and Tucker Streets (shown on Figure 4.14-1). The noise monitor was placed on a telephone pole on the northeast corner of the intersection. The average noise level from 8:08 to 11:08 AM was 49 dBA. Traffic volumes were low due to the adjacent streets, Front Street and Fitch Mountain, being the main roadways in the area. Volumes were also low because Second and Tucker is a "T" intersection with Tucker a dead-end to the east.

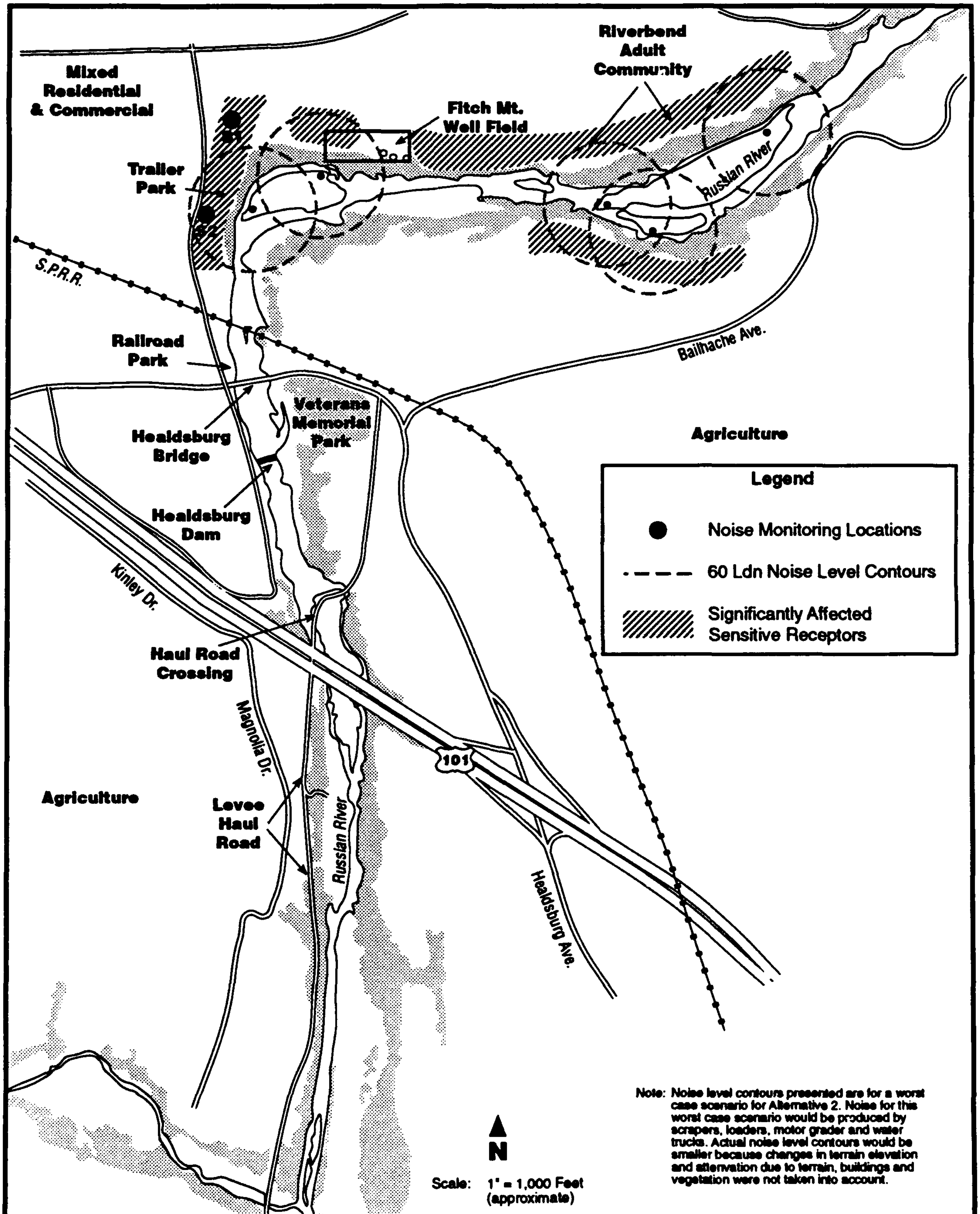


Figure 4.14-1
Noise Impacts

The second noise monitoring location was on the southeast corner of Mason and Front Street (see Figure 4.14-1). The average noise level from 12:00 to 14:00 was 64 dBA. Traffic volumes were moderate due to the intersection of two main arterials.

Depending on the location, ambient noise levels vary from approximately the high 40's in quiet areas along Westside Road south of Healdsburg to the 60's near major arterials in the City of Healdsburg. Noise levels would be higher closer to the railway tracks or Highway 101.

Regulatory Background

State of California

For applicable standards governing interior noise levels, Title 24 of the California Administrative Code (CCR 1988) establishes standards governing interior noise levels that apply to all new multifamily residential units in California. These standards require that acoustical studies be performed prior to construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation measures that will limit maximum L_{dn} noise levels to 45 dBA in any inhabitable room. Although there are no generally applicable interior noise standards pertinent to all uses, many communities in California have adopted an L_{dn} of 45 as an upper limit on interior noise in all residential units. The U.S. Department of Housing and Urban Development (HUD) has set an L_{dn} of 45 as its goal for interior noise in residential units built with HUD funding. Standard residential construction for single family units typically attenuate noise by 20 decibels; therefore, the *exterior L_{dn} should not exceed 65 in order for the California interior standard to be met.*

Sonoma County

The Sonoma County Noise Element would be considered a guide for significance for this project outside the Healdsburg city limits.[7] The County has noise level performance standards for noise- producing land uses that may affect noise sensitive land uses. Sonoma County also has a policy that areas are adversely affected if exposed to existing or projected exterior noise levels exceeding 60 L_{dn}. Where the 60 L_{dn} standard is not achievable using the best available noise reduction technology, a maximum level of up to 65 L_{dn} may be allowed. Sonoma County Ordinance No. 3437 regulates surface mining and reclamation and includes noise standards that are applied to mining operations. The ordinance allows more stringent requirements when local circumstances warrant additional protection.

The goals and objectives of the Sonoma County General Plan that are applicable to the project are:

Noise Goal #1	Protect people from the harmful effects of exposure to excessive noise and to achieve an environment in which people and land uses may function without impairment from noise.
Noise Objective #1	Provide noise exposure information so that noise impacts may be effectively evaluated in land use planning and project review.

Noise Objective #2	Develop and implement measures to avoid exposure of people to excessive noise levels.
Noise Objective #3	Protect the present noise environment and prevent intrusion of new noise sources which would substantially alter the noise environment.

City of Healdsburg

The City of Healdsburg General Plan would be considered a guide for significance for the activities at the Healdsburg Bendway, which is within the City limits.[8] The City policies indicate that areas are considered adversely affected if exposed to existing or projected exterior noise levels exceeding 60 L_{dn}. The General Plan noise goal and policies for the City of Healdsburg applicable to the project are:

Goal H: To protect the residents of Healdsburg from the harmful effects of exposure to excessive noise.

Policies:

1. Areas within Healdsburg exposed to existing or projected exterior noise levels exceeding 60 dB Ldn shall be designated as noise-impacted areas.

2. Areas within Healdsburg shall be designated as noise-impacted if exposed to existing or projected exterior noise levels exceeding the performance standards in Table II-1.

3. New development of residential or other noise-sensitive land uses will not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to:

   a. 60 db Ldn or less in outdoor activity areas, and interior noise levels to 45 dB Ldn or less, where the noise source is preempted from local control (i.e., traffic on public roadways, railroads, and airports). In areas where it is not possible to reduce exterior noise levels to 60 dB Ldn or less using a practical application of the best available noise-reduction technology, an exterior noise level of up to 65 dB Ldn will be allowed. Under no circumstances will interior noise levels be permitted to exceed 45 dB Ldn with the windows and doors closed.

   b. Achieve compliance with the standards in Paragraph 3.a. and with the performance standards set out in Table II-1, where the noise source is subject to local control (i.e., non-traffic related).

4. When industrial, commercial, or other land uses, including locally-regulated noise sources, are proposed for areas containing noise-sensitive land uses, noise levels generated by the proposed use shall not exceed the standards in Paragraph 3.a. or the performance standards set out in Table II-1.

5. Where the development of residential or other noise-sensitive land use is proposed for a noise-impacted area, an acoustical analysis shall be prepared at applicant's expense. The acoustical analysis shall:

TABLE II-1

NOISE LEVEL PERFORMANCE STANDARDS
FOR NEW PROJECTS AND DEVELOPMENTS

Noise created by non-preempted noise sources* associated with new projects or developments shall be controlled so as not to exceed the noise level standards set forth below as measured at any affected residential land use situated in either the incorporated or unincorporated areas. New residential development shall not be allowed where the ambient noise level due to non-preempted noise sources will exceed the noise level standard set forth below.

		Exterior Noise Level Standards, dBA	
Category	**Cumulative Number of minutes in any one-hour time period**	**Daytime 7 a.m. to 10 p.m.**	**Nighttime 10 p.m. to 7 a.m.**
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Each of the noise level standards specified above shall be reduced by five dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

*A preempted noise source is one that is regulated by the State or Federal Government at the source such as automobiles, railroads, and airports.

a. Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.

b. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

c. Include estimated noise levels in terms of Ldn and/or the standards in Table II-1 for existing and projected future noise levels, with a comparison made to the adopted policies of this subsection.

d. Include recommendations for appropriate mitigation to achieve compliance with the adopted policies of this subsection. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.

e. Include estimates of noise exposure after the prescribed mitigation measures have been implemented. If compliance with the policies of

this subsection will not be achieved, a rationale for acceptance of the project must be provided.

6. Noise level criteria applied to land uses other than residential or other noise-sensitive uses shall be consistent with recommendations of the California Office of Noise Control.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For the purposes of this EIR/EIS, impacts are considered significant if residences, schools and/or churches are subjected to levels of 60 L_{dn} or greater. If the existing noise level at a residence, church or school is above the standard of significance, the standard for that location is adjusted to the ambient noise level.

Method of Analysis

Noise levels due to the mining operations of the project are quantitatively estimated. Typical mining noise levels that would occur are difficult to calculate due to the variations and changes in the number, type and location of equipment used. However, noise levels can be estimated from the heavy duty mobile and stationary construction equipment emissions presented in Table 4.14-2, and the noise monitoring of scrappers (59 dBA @ 165+ feet) and draglines (69 dBA @ 450 feet).[9] Noise levels of the various pieces of equipment are added together using basic noise methodology. Predictions of the highest noise levels are made for the closest sensitive receptor to the mining site.

Noise levels due to the transportation of the aggregate on the haul road are quantitatively estimated using the computer model STAMINA.[10] One hundred round trips were assumed. California heavy truck vehicle noise emission levels were used.[11] For modeling, a simplified flat terrain with a hard surface was assumed.[12] From the output, the distances from the centerline to the 60, 65 and 70 L_{eq} noise levels are calculated. The distance to 60 L_{dn} is used to locate where the impacts would occur and how far setbacks need to be to comply with City and County policy.

The mining and transportation calculations were made assuming that there is direct line-of-sight between the noise sources and the sensitive receptor. Noise levels due to the project would be lower if there is a hill, berm, vineyard or building blocking the direct line-of-sight between the noise source and the sensitive receptor. Noise levels for receptors inside buildings with the windows closed would be 15 to 20 dBA lower.

Project and Cumulative Impacts

Project and cumulative impacts are presented together, because the noise standards are for all noise, including project-generated noise and background or ambient noise.

TABLE 4.14-2 CONSTRUCTION EQUIPMENT NOISE LEVELS[1] BEFORE AND AFTER MITIGATION		
	Noise Level at 50 Feet (dBA)	
Equipment Type	Without Noise Control	With Feasible Noise Control[2]
Earthmoving		
Front Loaders	79	75
Graders	85	75
Trucks	81	75
[1]Taken from *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, prepared by Bolt, Beranek, and Newman for the U.S. Environmental Protection Agency, December 31, 1971. [2]Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.		

Aggregate mining operations at all sites except Dole would produce noise from 7 AM to 3:30 PM, Monday through Friday, from several pieces of equipment, such as scrapers and water trucks. Haul Road noise would contribute to the noise level at the nearest receptors.

Aggregate operations at the Doyle site would produce noise from several pieces of equipment, such as scrapers, off-highway trucks, draglines, front-end loaders, and water trucks from 6 AM to 10:30 PM, Monday through Friday, and 6 AM to 4:30 PM on Saturday. Transportation noise would be produced by such equipment as scrapers, motor graders, off-highway trucks and water trucks.

Table 4.14-3 identifies potential noise impacts associated with each alternative at all proposed sites. The table presents information discussed under each impact statement, below. The table shows the distance to the nearest sensitive noise receptor at each site and anticipated project-created noise levels at that receptor. Also included in the table is the determination of impact significance.

Noise levels due to the transportation of aggregate along the haul road would be produced by such equipment as scrapers, motor graders, off-highway trucks and water trucks. Aggregate mining operation noise would also be heard at the receptor for most sites.

4.14-1 Implementation of some of the alternatives would increase noise levels on and around the Doyle site over the entire period of mining.

A-1 and A-5

Aggregate operations would not occur at the Doyle site, so sensitive receptors along the Russian River would not be affected by mining in the area. This impact is considered ***less than significant.***

A-2 through A-4

Calculated worst-case noise levels were made for the closest residence (at 2500 feet) and the closest church (at 6300 feet). The 60 L_{dn} contour would be approximately 700 feet from the mining operations at the Doyle site. Project-generated noise levels at the closest residence are estimated to be approximately 51 L_{dn}. Noise levels at the closest church are estimated to be approximately 44 L_{dn}. Because these levels are below 60 L_{dn}, this impact is ***less than significant.***

Mitigation Measures

4.14-1 *None required.*

4.14-2 Implementation of some of the alternatives could increase noise levels on and around the South Levee Haul Road site over the entire period of mining.

A-1 and A-5

Aggregate operations would not occur at the South Levee Haul Road site. The sensitive receptors along the Russian River would not be affected by mining in the area. This impact is considered ***less than significant.***

A-2 through A-4

Calculated worst-case noise levels were made for the closest residence (at 2800 feet) and the closest church (at 4200 feet). Project-generated noise levels at the closest residence are estimated to be approximately 43 L_{dn}. Noise levels at the closest church are estimated to be approximately 41 L_{dn}. The 60 L_{dn} contour would be approximately 200 feet from the center of the mining operation at South Levee Haul Road site.

Calculated worst-case noise levels were made for the closest residence (at 200 feet) to the haul road west of the river. Noise levels at the closest residence to the haul road are estimated to be approximately 50 L_{dn}. The actual noise level at the closest residence would be 5 to 15 dBA lower due to a short berm along the west side of the haul road. The 60, 65 and 70 L_{dn} contours would be within the right-of-way of the haul road, if they exist at all.

The combination of the mining and transportation noise levels would be below 60 L_{dn} at the nearest receptors; therefore, this impact is considered ***less than significant.***

TABLE 4.14-3
POTENTIAL NOISE IMPACTS AT NEARBY RECEPTORS (L_{dn})

	Nearest Residence		Nearest Haul Road Residence		Nearest Church		Nearest School		Significant Impact?
	Distance to (in feet)	Sound Level at	Distance to (in feet)	Sound Level at	Distance to (in feet)	Sound Level at	Distance to (in feet)	Sound Level at	
Doyle									
A-1 and A-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2 through A-4	2500	51	N/A	N/A	6300	44	N/A	N/A	No
South Levee Haul Road									
A-1 and A-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2 through A-4	2800	43	200	<45	4200	41	N/A	N/A	No
Middle Reach									
A-1 and A-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2	1400	52	200	<45	6900	41	N/A	N/A	No
A-3 and A-5	1400	47	200	<45	6900	38	N/A	N/A	No
North Levee									
A-1, A-4, and A-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2 and A-3	400	<51	200	<51	N/A	N/A	N/A	N/A	No
Healdsburg Bendway									
A-1, A-4, and A-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2	100	74	100	74	2500	48	2500	48	Yes
A-3	100	66	100	66	2500	44	2500	44	Yes
Riverbend									
A-1, A-4, and A-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
A-2	100	74	100	74	4400	44	3000	46	Yes
A-3	100	66	100	66	4400	41	3000	43	Yes

Mitigation Measures

4.14-2 *None required.*

4.14-3 Implementation of some of the alternatives would increase noise levels on and around the Middle Reach site over the entire period of mining.

A-1 and A-4

Aggregate operations would not occur at the Middle Reach site, so the sensitive receptors along the Russian River would not be affected by mining. This impact is considered ***less than significant.***

A-2 Calculated worst-case noise levels were made for the closest residence (at 1400 feet), and the closest church (at 6900 feet). The 60 L_{dn} contour would be approximately 500 feet from the center of the mining operation at the Middle Reach site. Noise levels at the closest residence are estimated to be approximately 52 L_{dn}. Noise levels at the closest church are estimated to be approximately 41 L_{dn}.

Calculated worst-case noise levels were made for the closest residence (at 200 feet) along the haul road west of the river. Noise levels at the closest residence would be approximately 50 L_{dn}. The actual noise level at the closest residence would be 5 to 15 dBA lower due to a short berm along the west side of the haul road. The 60, 65, and 70 dBA contours would be within the right-of-way of the haul road, if they existed at all.

The combination of mining and transportation noise levels would be below 60 L_{dn} at the nearest receptors, so this impact is considered ***less than significant.***

A-3 and A-5

Calculated worst-case noise levels were made for the closest residence (1400 feet), and the closest church (at 6900 feet). Noise levels at the closest residence are estimated to be approximately 47 L_{dn}. Noise levels at the closest church are estimated to be approximately 38 L_{dn}. The 60 L_{dn} contour would be approximately 200 feet from the center of the mining operation at the Middle Reach site.

Transportation noise levels due to the aggregate mining operations at the Middle Reach site would be the same as Alternative 2.

The combination of mining and transportation noise levels would be below 60 L_{dn} at the nearest receptors, so this impact is considered ***less than significant.***

Mitigation Measures

4.14-3 *None required.*

4.14-4 Implementation of some of the alternatives would cause increases in noise levels on and around the North Levee site over the entire period of mining.

A-1, A-4 and A-5

Aggregate operations would not occur at the North Levee site under these alternatives. The sensitive receptors along the Russian River south of Healdsburg and in Healdsburg would not be affected. Therefore, this impact is considered ***less than significant***.

A-2 and A-3

Calculated worst-case noise levels were made for the closest residence 200 feet from the haul road and 400 feet from the mining operations. Noise levels at the closest residence are estimated to be approximately 56 L_{dn}. The actual noise level at the closest residence would be 5 to 15 dBA lower due to a short berm along the west side of the haul road. The 60 L_{dn} contour would be approximately 120 feet from the haul road centerline. The 65 and 70 L_{dn} contours would be within the right-of-way of the haul road if they existed at all. The 60 L_{dn} contour would be approximately 200 feet from the center of the mining activity at the North Levee site.

The combination of mining and transportation noise levels would be below 60 L_{dn} at the nearest receptors, so this impact is considered ***less than significant***.

Mitigation Measures

4.14-4 *None required.*

4.14-5 Implementation of some of the alternatives would cause increases in noise levels on and around the Healdsburg Bendway site over the entire period of mining.

A-1, A-4 and A-5

Aggregate operations would not occur at the Healdsburg Bendway site under these alternatives, so the sensitive receptors along the Russian River in Healdsburg would not be affected by mining in the area. This impact is considered ***less than significant***.

A-2 Calculated worst-case noise levels were made for the closest residence at 100 feet, residences at 200 and 300 feet and the closest school and church receptor (both at 2500 feet). Construction of the five spurs on the northwest side of the Russian River would produce high exterior noise levels. The traffic is a minor noise source. Noise levels at the closest residence are estimated to be approximately 74 L_{dn}. Residences within 200 feet

of the mining activities would be exposed to noise levels of approximately 68 L_{dn} if the noise from the mining equipment is not obstructed by barriers or buildings. Residences within 300 feet of the mining activities would be exposed to noise levels of approximately 65 L_{dn} if the noise is not obstructed. Actual noise levels at residences that are not in direct "line-of-sight" with the mining equipment would be 5 to 15 dBA lower. Noise levels at the closest school and church are estimated to be approximately 48 L_{dn}. The 70 L_{dn} contour would be approximately 120 to 160 feet from the center of the mining activities at the Healdsburg Bendway site. The 65 L_{dn} contour would be approximately 150 to 300 feet from the center of the mining activities. The 60 L_{dn} contour would be approximately 180 to 500 feet from the mining operations.

The combination of the mining, transportation, construction, and background noise levels would be above 60 L_{dn} at several residences near the Healdsburg Bendway for the 2 months of any year when mining occurred at the site. Therefore, this is considered a ***short-term, significant and unavoidable impact.***

A-3 Calculated worst-case noise levels were made for the closest residence at 100 feet, residences at 200 and 300 feet, and the closest school and church (both at 2500 feet). Noise levels at the closest residence are estimated to be approximately 66 L_{dn}. Residences within 200 feet of the mining activities would be exposed to noise levels of approximately 60 L_{dn} if the noise is not obstructed. Residences within 300 feet would be exposed to noise levels of approximately 57 L_{dn} if the noise is not obstructed. Actual noise levels at residences that are not in direct line-of-sight with the mining equipment would be 5 to 15 dBA lower. Noise levels at the closest school and church were estimated to be approximately 44 L_{dn}. The 70 L_{dn} contour may or may not exist along the outer perimeter of the mining area. The 65 L_{dn} contour would be approximately 100 to 120 feet from the center of the mining activities at Healdsburg Bendway. The 60 L_{dn} contour ould be approximately 120 to 200 feet from the mining operations.

Due to the combination of the mining, transportation, and background noise levels would be above 60 L_{dn} several residences near the Healdsburg Bendway site, this impact is considered a ***short-term significant and unavoidable impact.***

Mitigation Measures

Implementation of Mitigation Measure 4.14-5 would reduce impacts *but not to a less-than-significant level.*

4.14-5 *The contractor shall use mufflers, enclosure panels, or other noise suppression attachments on all equipment as appropriate and turn off equipment when it is not in use. This measure would be required for Alternatives 2 and 3.*

The contractor should employ the quietest among alternative equipment to muffle and control noise from available equipment. The U.S. General Services Administration has determined that the noise reductions shown in Table 4.14-1 are attainable without undue difficulty or expense.

4.14-6 Implementation of some of the alternatives would cause increases in noise levels on and around the Riverbend site over the entire period of mining.

A-1, A-4 and A-5

Aggregate operations would not occur at the Riverbend site under these alternatives. The sensitive receptors along the Russian River in Healdsburg would not be affected. Therefore, this impact is considered ***less than significant.***

A-2 Calculated worst-case noise levels were made for the closest residence at 100 feet, residences at 200 and 300 feet, the closest school (at 3000 feet), and closest church (at 4400 feet). Noise levels at the closest residence were estimated to be approximately 74 L_{dn}. Residents within 200 feet of the mining activities would be exposed to noise levels of approximately 68 L_{dn} if the noise is not obstructed. Residents within 300 feet of the mining activities would be exposed to noise levels of approximately 65 L_{dn} if the noise is not obstructed. Actual noise levels at the residences that are not in direct line-of-sight with the mining equipment would be 5 to 15 dBA lower. Noise levels at the closest school are estimated to be approximately 46 L_{dn}. Noise levels at the closest church are estimated to be approximately 44 L_{dn}. The 70 L_{dn} contour would be approximately 120 to 160 feet from the center of the mining operation at the Riverbend site. The 65 L_{dn} contour would be approximately 150 to 300 feet from the center of the mining activities. The 60 L_{dn} contour would be approximately 180 to 500 feet from the mining operations.

The combination of the mining, transportation, and background noise levels would be above 60 L_{dn} at several residences near the Riverbend site. This is considered a ***short-term significant and unavoidable impact.***

A-3 Calculated worst-case noise levels were made for the closest residence at 100 feet, residents at 200 and 300 feet, the closest school (at 3000 feet), and closest church (at 4400 feet). Noise levels at the closest residence are estimated to be approximately 66 L_{dn}. Residents within 200 feet of the mining operations would experience noise levels of approximately 60 L_{dn} if the noise is not obstructed. Residents within 300 feet would be exposed to noise levels of approximately 57 L_{dn} if the noise is not obstructed by barriers or buildings. Actual noise levels at residences that are not in direct line-of-sight with the mining equipment would be 5 to 15 dBA lower. Noise levels at the closest school are estimated to be approximately 43 L_{dn}. Noise levels at the closest church are estimated to be approximately 41 L_{dn}. The 70 L_{dn} contour could exist along the outer perimeter of the mining area. The 65 L_{dn} contour would be approximately 100 to 120 feet from the center of the mining activity. The 60 L_{dn} contour would be approximately 120 to 200 feet from the mining operations.

The combination of the mining, transportation, and background noise levels would be above 60 L_{dn} several residences near the Riverbend site for 2 months of the years when mining occurred at the site. This impact is considered a ***short-term significant and unavoidable impact.***

Mitigation Measures

Implementation of Mitigation Measure 4.14-6 would reduce impacts *but not to a less-than-significant level.*

4.14-6 *Implement Mitigation Measure 4.14-5. This measure would be required for Alternatives 2 and 3.*

ENDNOTES

1. Federal Highway Administration, 1982. *Report of Field Review - Highway Traffic Noise Impact Identification and Mitigation Decisionmaking Process*, Office of Environmental Policy, June.

2. Code of California Regulations (CCR), 1988. *California Noise Insulation Standards, California State Building Code (Part 2, Title 24, CCR), Appendix Chapter 35, Sound Transmission Control.*

3. Ventura County Board of Supervisors, 1989. Ventura County General Plan Hazards Appendix. December 19.

4. Northwestern Pacific Railroad. Personal communication with a dispatcher who would not give his name on November 12, 1991 on the number of trains traveling through Healdsburg a day.

5. Sonoma County, 1989. *Sonoma County General Plan*, March 23.

6. Swing, Jack, 1975. *Estimation of Community Noise Exposure in Terms of Day-Night Average Level Noise Contours*. Office of Noise Control, State of California, Department of Health. May.

7. Sonoma County, 1989. Op cit.

8. City of Healdsburg, 1987. *City of Healdsburg General Plan.*

9. Fitzroy Dobbs Consultants in Architectural Acoustics and Noise Control. Two letters to Tal Bailey of Syar Industries, Inc. on the noise levels monitored from scrapers and "dragline" used by Syar. November 10, 1986 and May 19, 1987.

10. Towne, Richards and Chaudiere, 1984. STAMINA. Program software.

11. California State Department of Transportation, 1985. *California vehicle noise emission levels*, Office of Transportation Laboratory, February 28.

12. Bowlby, William, John Higgins and Jerry Reagan, 1982. *Noise Barrier Cost Reduction Procedure STAMINA 2.0/Optima: Users Manual.* U.S. Department of Transportation, Federal Highway Administration, Arlington, VA, April.

4.15 PUBLIC HEALTH AND SAFETY

4.15 PUBLIC HEALTH AND SAFETY

INTRODUCTION

This section will discuss the public health and safety effects of the reclamation of the six proposed mining sites and the mining operations that will precede reclamation. This section will also discuss secondary features of the mining/reclamation process such as temporary stream crossings and their effects on public safety. Some safety-related impacts, such as carbon monoxide levels, noise and traffic accidents, are discussed in sections 4.12, Transportation; 4.13, Air Quality; and 4.14, Noise.

SETTING

Public health and safety issues may arise from the use of heavy equipment, installation of temporary stream crossings and deep pit excavation during active aggregate mining operations. Excavation operations occurring farther away from residential areas, such as those in agricultural areas, tend to be less of a threat to the population than those in a more urban/residential setting. Reclaimed mining sites may also affect public safety if unsafe conditions are allowed to persist following reclamation.

Boating

Instream mining operations typically require the installation of temporary stream crossings. These crossings can create hazards for river recreationists and canoeists. Instream crossings may create a river-wide obstruction with the potential to upset canoes or trap boaters. Box-culvert diversions create drop-offs or spillovers that can upset canoes and/or potentially injure river recreationists unaware of their presence.

Mining Operations

Certain mining operations pose potential hazards to the public. Open pits presents hazards due to their steep and possibly unstable slopes. In addition, use of heavy machinery presents possible dust and noise hazards, as well as potential injury to those present during their operation. Ponded water within excavation pits have the potential to breed mosquitoes and create a public hazard.

Hazardous Materials

The use of heavy equipment during aggregate extraction often requires storage of hazardous materials such as fuels, oils/lubricants and solvents on site. There is the potential for a spill to

occur and possibly expose workers and/or the public. Hazardous materials, as defined by California Code of Regulations (CCR) Title 22, Section 66084, "is a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed."

The generation, storage and handling of hazardous materials are regulated by federal, state and local laws and regulations aimed at the protection of public health and the environment.

While different agencies within Sonoma County have responsibilities in the regulation of hazardous substances, the Health Department has been designated as the lead agency for preparation of comprehensive hazardous materials/waste management plans. The County and City Departments of Environmental Health, Department of Public Works, and fire departments are also involved directly in the management of hazardous materials and wastes within Sonoma County.

City and County General Plan and Policies

The Sonoma County General Plan, Healdsburg General Plan, and the Aggregate Resources Management (ARM) Plan do not specifically address public health and safety policies relating to terrace and instream aggregate mining operations. However, the City's General Plan has the following goal and policies for the use of hazardous materials.

Goal F: To protect Healdsburg residents from the effects of hazardous materials.

Policies:

1. City approvals of all new development shall consider the potential for the production, use, storage, and transport of hazardous materials and provide for reasonable controls on such hazardous materials.

2. Within its authority, the City shall regulate the production, use, storage, and transport of hazardous materials to protect the health of Healdsburg residents.

3. As part of the specific plan prepared and adopted for the northern part of the Urban Services Area, the City shall provide for reasonable setbacks of new development from the County sanitary landfill should monitoring and studies show that the landfill generates off-site impacts that pose health or safety hazards for future residents in the adjacent area. The City shall strongly encourage the County to mitigate any identified impacts on the landfill site itself.

Like most industrial operations, aggregate mining does require the use of some hazardous materials, such as gasoline and solvents. The proposed changes to the ARM Plan include standards that relate to public health and safety. These countywide requirements are found in the revised Chapter 26A of the County Code. In general, reclamation of aggregate mining sites shall eliminate, minimize or mitigate all hazards to public health and safety, including unstable

slopes, dangerous equipment, toxic substances, water pollution, disease vectors and access to adjacent properties. Requirements for aggregate operations include:

1. All aggregate operations shall protect both public security and private property. The operator shall be required to install fencing and gates, post warning signs, provide site patrol, and take other actions required as use permit conditions to ensure security of the site and private access thereto.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

For purposes of this EIR/EIS, impacts are considered significant if the public would be exposed to project-related conditions that could lead to death, injury, disfigurement, or impaired health.

Method of Analysis

By using existing information, this analysis provides a qualitative discussion of health and safety hazards. Information was obtained from the City of Healdsburg Public Works and Planning Departments, the 1981 ARM Plan and proposed revisions to that plan, the North Coast Regional Water Quality Control Board, the Department of Mines and Geology, the Department of Boating and Waterways, and the Sonoma County and City of Healdsburg General Plans.

Project Impact

4.15-1 A public safety hazard would be created by deep, open pits with steep side slopes.

A-1 This Alternative would not create any pits. Therefore, this impact is considered ***less than significant.***

A-2 through A-5

Under Alternatives 2 through 5, deep pits would be created at the Doyle site during excavation operations. Pits would be created at the Middle Reach site under Alternative 5. These pits pose an attractive nuisance to the general public. Due to the steepness and instability of the pit slopes, this impact is considered ***significant.***

Mitigation Measures

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant level.*

4.15-1(a) *The operator shall comply with county requirements that would limit public access to the site. (See Requirements for Aggregate Operations, above.) This measure would be required for Alternatives 2 through 5.*

4.15-1(b) *For terrace operations, side slopes for the pits shall equal 1.5 horizontal to 1 vertical for areas above maximum groundwater level, and 1:1 for areas below maximum groundwater level. For instream operations, cuts in gravel bars at property lines or on the edge of mining activities shall be no steeper than 2 horizontal to 1 vertical in slope. This measure would be required for Alternatives 2 through 5.*

Project Impact

4.15-2 Potential safety hazards to river recreationists and canoeists could occur from temporary instream crossings.

A-1 This alternative would allow continued annual reconstruction of the temporary Russian River crossing just north of Highway 101, but would not require instream crossings. Therefore, this impact is considered ***less than significant.***

A-2 and A-3

Five of the six sites would use temporary instream crossings in their operations. These crossings are river-wide obstructions. If adequate clearance is not maintained beneath the crossing, there is the potential for boaters and canoeists to become injured or trapped while trying to navigate beneath it. This is considered a ***significant impact.***

A-4 Two sites (South Levee and Middle Reach) would be mined and reclaimed, requiring stream crossings. This is considered a ***significant impact.***

A-5 Stream crossings would not be required on-site for the Floodplain Skimming/Streamway Development Alternative. Therefore, this is considered a ***less-than-significant impact.***

Mitigation Measure

4.15-2 *Implement Mitigation Measure 4.10-1, which addresses canoeist safety at temporary stream crossings.*

Project Impact

4.15-3 A safety hazard to river recreationists could be created from the existing concrete box culvert with water surface drop-off.

A-1, A-4 and A-5

No activities would take place above the Middle Reach site. Therefore, this is considered a ***less-than-significant impact.***

A-2 and A-3

Construction of the temporary stream crossing at the Riverbend site would make use of an existing box culvert, which extends into the river. This culvert diverts the river flow into one area of the river and creates a river-level drop-off or spillover. Canoeists and other river recreationists could accidentally be swept through the culvert spillover and risk potential upset and/or injury. This is considered a ***significant impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.15-3 *Concrete culverts shall be adequately signed to inform boaters of the potential hazard and identify portage options. This measure would be required for Alternatives 2 and 3.*

Project Impact

4.15-4 General safety hazards, as listed below, associated with aggregate mining operations would be created.

A-1 Since no mining or reclamation activities would occur under this alternative, this is considered a ***less-than-significant impact.***

A-2 through A-5

Open pits, heavy machinery, dust, noise, increased traffic and river obstructions create potential safety hazards to both the public and site workers. Hazardous materials and wastes used and stored on site present exposure potential to workers and the public. Storage and use of these materials presents the possibility of chemical exposure from spills occurring on the river banks or in the river stream. These are considered ***significant impacts.***

Mitigation Measures

Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant level.*

4.15-4(a) *Operations shall comply with worker safety requirements under Cal OSHA 3203 worker health and safety standards. This includes signage identifying the site health and safety officers. This measure would be required for Alternatives 2 through 5.*

4.15-4(b) *Implement Mitigation Measure 4.15-1. This measure would be required for Alternatives 2 through 5.*

4.15-4(c) *All operations shall comply with requirements of the Uniform Fire Code, the Uniform Building Code, and all county, federal, and state regulatory requirements. This measure would be required for Alternatives 2 through 5.*

<u>Project Impact</u>

4.15-5 A health hazard could result from ponded water in pits.

A-1 through A-5

A health hazard currently exists at the Doyle site and would persist under Alternatives 2 through 5 due to still water within excavation pits. These sites have the potential for substantial mosquito breeding. This is considered a ***significant impact***.

<u>Mitigation Measure</u>

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.15-5 *Operations shall follow requirements of the Sonoma County Mosquito Abatement District. This measure is required for Alternatives 1 through 5.*

<u>Project Impact</u>

4.15-6 The spurs at the Healdsburg Bendway could create a boating hazard when the dam's flashboards are in place.

A-1, A-3 through A-5

No spurs would be constructed under these alternatives, so this is considered a ***less-than-significant impact***.

A-2 Under this alternative, five spurs would be constructed at the Healdsburg Bendway (see Figures 3-13 and 3-16). The spurs would range in elevation from 72 to 82 feet MSL and would project 100 to 180 feet from the north bank of the river. When the flashboards are not in place (September through May), four of the spurs would be as much as 8 feet above the river, so they would be clearly visible to boaters. The downstream spur would be approximately 2 feet below the surface, where it could damage the undersides of boats. From Memorial Day through Labor Day, the southern most spur would be under approximately 8 feet of water. The remaining spurs would be visible approximately 2 feet above the water. This is considered a ***significant impact***.

<u>Mitigation Measure</u>

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.15-6 *Implement Mitigation Measure 4.10-6, which requires that signs be posted marking the location and depth of spurs. This measure is required for Alternative 2.*

Project Impact

4.15-7 The proposed mining operations would take place within the 100-year floodplain and could expose workers and equipment to flood hazards.

A-1 No mining operations would occur with this alternative. Therefore, this impact is considered ***less than significant.***

A-2 through A-5

All mining operations proposed under these alternatives would take place within the 100-year floodplain and be subjected to potential flood hazards. However, the proposed operations would occur during dry months/(seasons) which would significantly lower the probability of flooding in the area. Therefore, this impact is considered ***less than significant.***

Mitigation Measures

4.15-7 *None required.*

Project Impact

4.15-8 Proposed mining operations could result in hazards to pedestrian and bicyclists associated with truck travel along haul roads.

A-1 Under the No Project Alternative, gravel operations in the Russian River channel and low terraces would cease. Therefore, gravel truck travel in the vicinity of the project site, particularly along the private haul road and Westside Road, would decrease. However, it must be assumed under this alternative that aggregate would have to be transported from other parts of the County in order to meet market demand or that greater production from other sources (Quarry mining) would be required. In this case, gravel truck traffic would increase on other county roads. However, the number of trucks that would be added to the entire roadway system is not substantial compared to existing conditions. Therefore, this alternative would not create hazards to pedestrians and bicyclists above those that already exists. This is considered a ***less-than-significant impact.***

A-2 Generally operations would be conducted from 7 AM to 3:30 PM, Monday through Friday. The haul road that would be used for transporting material to the processing plant would not cross any city or county road. However, local residents frequently walk or bicycle along the haul road, and farmers use the road for agricultural purposes. However, the haul road is private and posted with "No Trespassing" signs.

At the Doyle site, the hours of operation are expected to be 6 AM to 10:30 PM Monday through Friday, and 6 AM to 4:30 PM on Saturday. Initially, this site is proposed to process all material on site. In the later stages of excavation at the Doyle site, the processing plant would be closed, and materials would be transported on Eastside Road to the Healdsburg plant. In this case, no haul road would be used. This is considered a ***potentially significant impact.***

A-3 and A-4

These alternatives would have slightly fewer trucks travelling on the haul road than the proposed project. Safety impacts would still remain significant. Therefore, this is considered a ***potentially significant impact.***

A-5 This alternative proposes operations similar to that of the proposed project. Truck travel would be expected to also be similar to that of the proposed project. Therefore, this is considered a ***potentially significant impact.***

Mitigation Measure

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant level.*

4.15-8 *The project proponent shall post signs indicating the haul road is a private road and is used as a "heavy vehicle route". The language shall be posted in Spanish as well as in English. This mitigation measure would be required for Alternatives 2 through 5.*

With the appropriate signage, pedestrians, bicyclists and other motorists would be alerted to the fact that the haul road is frequently used for gravel truck traffic. In addition, the sign would identify the road as private, thereby alerting non-authorized users they are trespassing.

Cumulative Impacts

No cumulative impacts to public health and safety are anticipated.

4.16 SOCIOECONOMIC CONCERNS

4.16 SOCIOECONOMIC CONCERNS

INTRODUCTION

The Socioeconomic Concerns section of this EIR/EIS briefly describes the existing population and employment of the City of Healdsburg and Sonoma County. Effects of the alternatives are evaluated and compared with existing conditions to determine impacts.

SETTING

Population

Total Population

The State of California had a 1990 Census population of 29,760,021 persons. The population of Sonoma County in 1990 was 388,222 persons. The City of Healdsburg reported a total population of 9,469 persons. Among cities in Sonoma County, Healdsburg is projected to have the largest change in population by 2010, with an increase in population share from 7 percent in 1990 to 10 percent in 2010. Santa Rosa is projected to decrease in county population share from 42 percent to 41 percent by 2010.

Population Trends

Most planning areas within the county are projected to grow near the countywide average of 41 percent by 2010. However, the highest percentage gain is projected for Healdsburg, at 90 percent, while the lowest change is projected for the Russian River and the Sebastopol planning areas with 22 and 23 percent, respectively. Table 4.16-1 summarizes the projected populations for planning areas within Sonoma County.

Employment

Category of Worker

The 1990 Census reports seven categories (or "classes") of workers. These categories represent the type of employers for whom the employed persons work. These are:

TABLE 4.16-1
POPULATION[1]

PLANNING AREAS	1990		2010		GROWTH 1990-2010	
	Number	Percent	Number	Percent	Number	Percent
Sonoma County	363,200	100	511,792	100	148,592	41
Sonoma Coast	6,500	2	9,285	2	2,785	43
Cloverdale	10,500	3	15,074	3	4,574	44
Healdsburg	26,200	7	49,700	10	23,500	90
Russian River	14,120	4	17,259	3	3,139	22
Santa Rosa	151,200	42	207,539	41	56,339	37
Sebastopol	25,160	7	31,022	6	5,862	23
Rohnert Park/Cotati	42,100	12	60,623	12	18,523	44
Petaluma	54,530	15	75,916	15	21,386	39
Sonoma Valley	32,890	9	46,467	9	13,577	41

[1] Revised to Reflect Amendments and Corrections as of April 9, 1991, from Table LU-1, Population By Planning Areas and City, 1990 and 2005. Projections of city plus unincorporated areas. Year 2010 estimated by using the annual compound rate of change from 1989 to 2005 for the County and distributing the County total to Planning Areas based upon each Planning Area's share of the General Plan's year 2005 total.

SOURCE: EIP Associates, from Sonoma County Planning Department, *Land Use Element, General Plan*, March 23, 1989.

Private for profit wage and salary workers;
Private not-for-profit wage and salary workers;
Local Government workers;
State Government workers;
Federal Government workers;
Self-employed workers; and
Unpaid family workers.

These employees are then represented by the type of industry in which they are employed and the type of occupation that the workers hold within that industry. Figure 4.16-1 summarizes the distribution of employed persons by worker category. Figure 4.16-2 shows the distribution of employment by the industry in which the workers are employed, and Figure 4.16-3 represents the distribution of workers by occupation. These figures all show information for employed persons aged 16 and older. The data shown is represented in a percent distribution to allow a graphical comparison between the City of Healdsburg, Sonoma County, and the state.

Sonoma County worker categories are very similar to those of the state and the City of Healdsburg. Two exceptions worthy of note are a higher proportion of self-employed persons within the County, and a correspondingly lower proportion of persons who work for private employers.

As can be seen from Figure 4.16-1, the City has higher proportions of persons employed in the private sector, primarily due to a lack of major government-sector employment. Figure 4.16-2 shows that the City has higher proportions of persons employed in retail, public administration, and construction industries than the state as a whole, and Sonoma County as a whole. However, the City has fewer persons employed in professional services, durable-goods manufacturing, and wholesale industries. Figure 4.16-3 shows that the City has slightly fewer persons in professional occupations, but more persons who are employed as service and craft employees.

Income distribution within Sonoma County falls generally within the norm for the state. The County has a slightly higher proportion of households in the middle income brackets between $40,000 and $60,000 per year. The County has a higher proportion of households than the City in the upper-middle income range of $75,000 to $100,000.

IMPACTS AND MITIGATION MEASURES

Standards of Significance

The CEQA Guidelines, Section 15382, defines a "significant" impact as one that has "...a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project..." The Guidelines go on to state that economic or social changes by themselves are not considered a significant effect. However, social or economic changes related to physical change "may be considered in determining whether the physical change is significant."

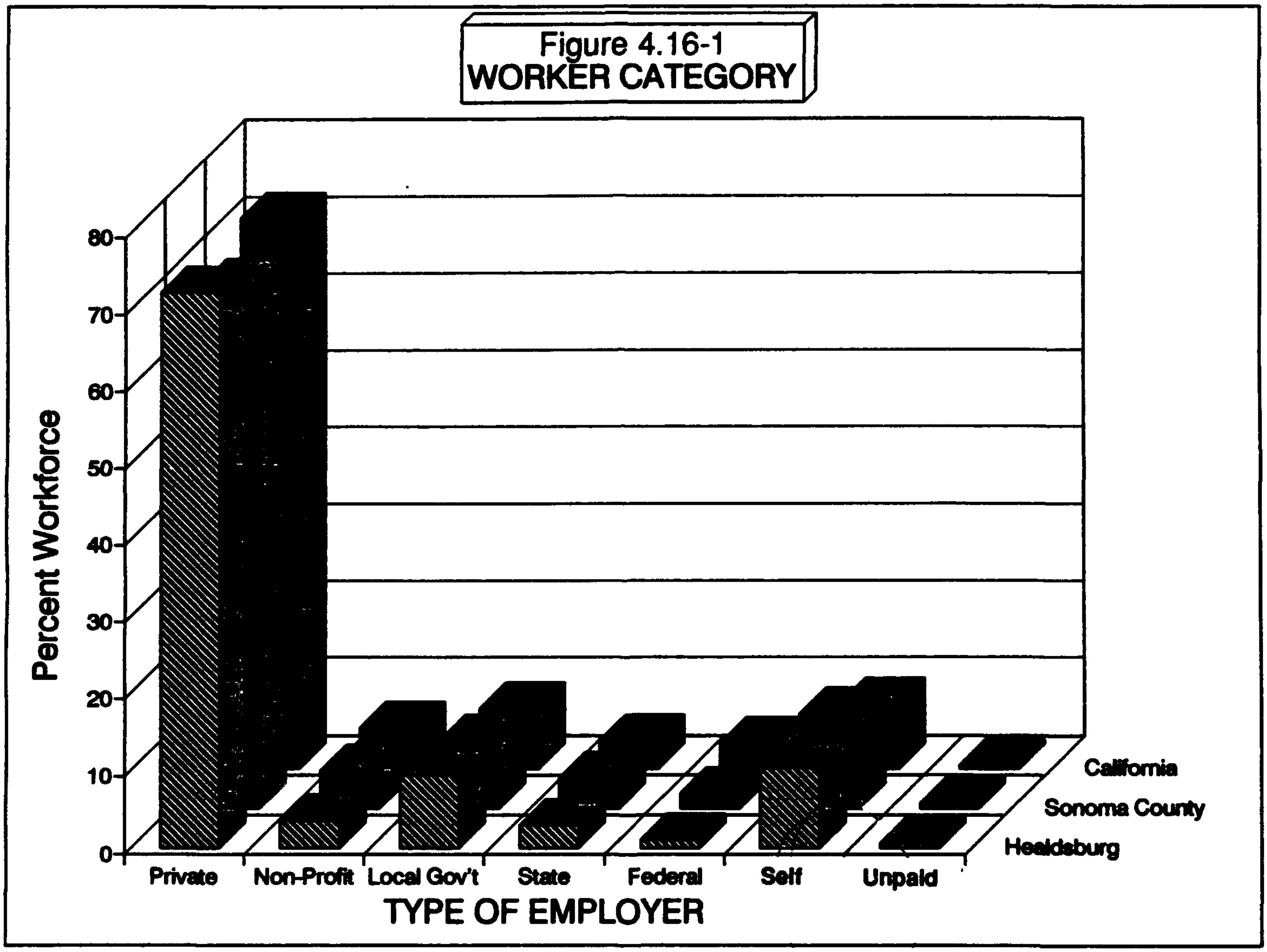


Figure 4.16-1
WORKER CATEGORY
Percent Workforce
80
70
60
50
40
30
20
10
0
Private
Non-Profit
Local Gov't
State
Federal
Self
Unpaid
TYPE OF EMPLOYER
California
Sonoma County
Healdsburg

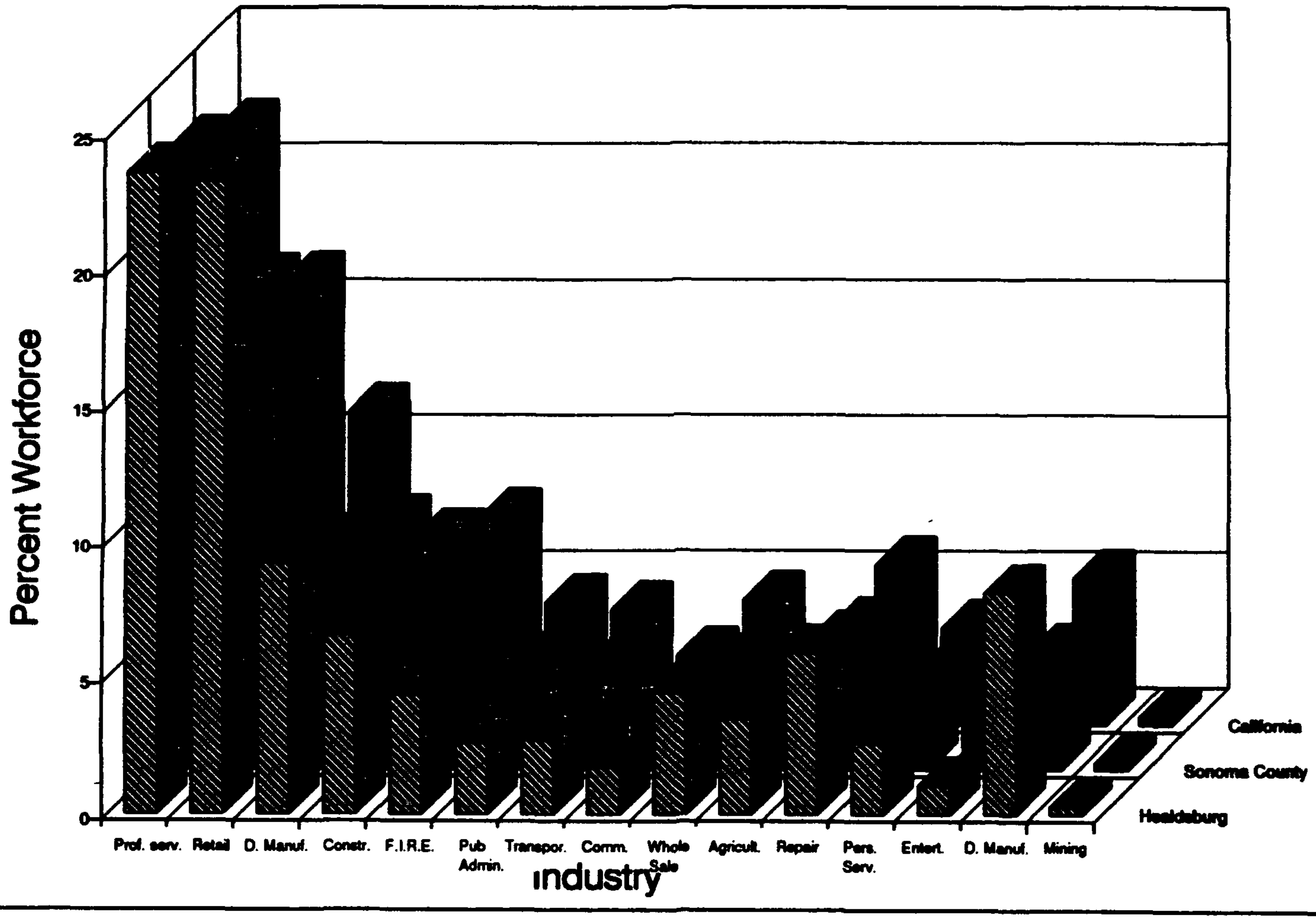


Figure 4.16-2
INDUSTRY OF EMPLOYMENT

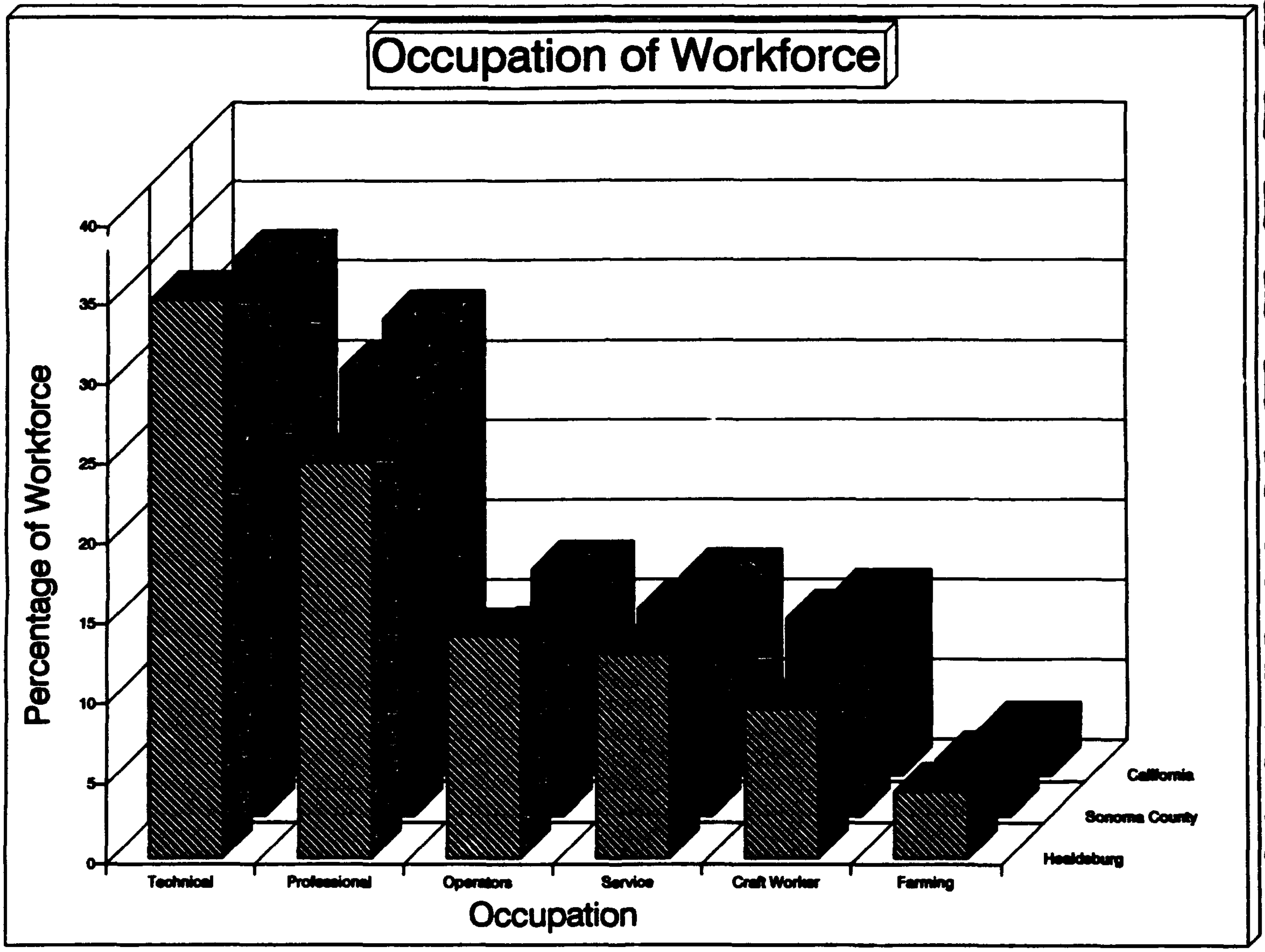

Occupation of Workforce
Percentage of Workforce
40
35
30
25
20
15
10
5
0
Technical
Professional
Operators
Service
Craft Worker
Farming
Occupation
California
Sonoma County
Healdsburg

Figure 4.16-3

Similarly, NEPA (40 CFR 1508.14) states that, when economic or social and natural or physical impacts are interrelated, "the environmental impact statement will discuss all of these effects on the human environment."

For the purposes of this EIR/EIS, an impact is considered significant if any of the following would occur:

- The marketability of existing housing or demand for additional housing is substantially affected.
- A loss of revenues to local governments which could result in adverse physical conditions.

<u>Method of Analysis</u>

Employment at the Healdsburg facility would be dependant upon the level of activity generated by the aggregate removal. As this varies among the alternatives, information regarding the number of person-hours required to extract and process aggregate was obtained from Syar Industries. The number of hours required may vary depending upon the level of activity and on overall market activity. Syar Industries estimates that it requires 0.08 person-hours of labor per ton of material.[1]

Aggregate Removal Assumptions

The following assumptions were made to determine the amount of aggregate that would be removed during each season for the alternatives. The tons of material per season for each alternative is shown in Table 4.16-2.

<u>Alternative 1</u>

No additional aggregate would be removed. Existing operations would continue at a level similar to the 1993 level.

<u>Alternative 2</u>

Aggregate would be mined according to the schedule outlined in Table 3-2 of the Project Description. Season 1 would include activity in the Doyle Pit, Healdsburg Bendway, and the Middle Reach.

<u>Alternative 3</u>

This alternative would follow a format similar to that of Alternative 2, only with the lower intensities ascribed to this alternative. Doyle Pit operations would remain the same at 300,000 tons per year. South Levee operations would remain the same as Alternative 2 and be mined in Season 2. The Middle Reach would be mined in seasons three and four, only at a lower intensity

TABLE 4.16-2

CHANGE IN TONS OF MATERIAL PER SEASON BY ALTERNATIVE

Season	Alt. 1	Alt. 2	Alt. 3	Alt. 4.	Alt. 5
1	0	537,500	333,000	300,000	224,000
2	0	727,500	523,000	430,000	224,000
3	0	525,000	470,000	300,000	224,000
4	0	625,000	420,000	300,000	224,000
5	0	500,000	350,000	300,000	224,000
SOURCE: Syar Industries, EIP Associates.					

of 70,000 tons per year. The North Levee operations would be unchanged and would occur in Season Three. The Healdsburg Bendway would be mined in Seasons 1 and 2, only at the lower intensity of 33,000 tons per year. The Riverbend would be mined in Seasons 4 and 5 at 50,000 tons per year.

Alternative 4

Under this Alternative, the Doyle Pit operations would remain unchanged at 300,000 tons per year. However, the only other location to be mined would be the South Levee area which is assumed to be mined at a level of 130,000 tons in Season 2.

Alternative 5

Under this Alternative, it is assumed that the Doyle Pit operations are not continued, and that the only mining operation is a new floodplain pit along the Middle Reach. This would operate at a mining intensity of 224,000 tons per year over the five-season period.

Additional Operational Assumptions

In addition to these assumptions regarding phasing of the mining operations, it is necessary to make several further assumptions regarding the operations. It was assumed that to obtain annual full-time equivalent employment numbers (the total number of persons employed may vary), one full-time employee would represent 1,920 person-hours of labor over the course of a year. This is based on a 40-hour workweek, with ten workday holidays and ten days of vacation per year. For purposes of this analysis, whether or not these represent paid holidays and vacations does not affect the total number of full-time equivalent (FTE) employees generated by the alternatives.

Estimated Employment Changes

Estimates of employment changes were calculated by multiplying the person-hours per ton of material (0.08 hours) by the number of tons for each alternative. The result is the number of labor hours required for each alternative. The number of labor hours was then divided by 1,920 hours (40 hours/week times 48 weeks per year) to determine the number of FTE employees on an annualized basis. Actual employment may vary throughout the season and the year as processing and market requirements dictate. Table 4.16-3 summarizes the 1990 and 1993 employment for the Healdsburg plant. Table 4.16-4 shows estimates of future employment changes under the alternatives, while Table 4.16-5 summarizes the resulting total employment by alternative for the Healdsburg plant.

Total employment was determined based on 1993 employment levels at the Healdsburg plant. The change in employment for the alternatives (summarized in Table 4.16-4) was added to the 1993 employment (Table 4.16-3). Estimates of the number of independent haulers were made based on the number of plant employees proportional to the number of independent haulers, employed in 1990 and 1993.

TABLE 4.16-3

1990 AND 1993 EMPLOYMENT - HEALDSBURG PLANT

Employment	1990	1993
Plant Personnel	67	44
Independent Haulers	75-100	40-50

SOURCE: Syar Industries, Inc.

TABLE 4.16-4
CHANGE IN FULL-TIME EQUIVALENT EMPLOYEES

Seasons	Alt. 1[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5
1	0	22	14	13	9
2	0	30	22	18	9
3	0	22	20	13	9
4	0	26	18	13	9
5	0	21	15	13	9

[1] Under Alternative 1, it is assumed that activity levels at the Healdsburg plant would continue at present levels. The zero change in employment indicates no anticipated change from current operating levels.

SOURCE: Syar Industries Inc., EIP Associates.

TABLE 4.16-5

TOTAL EMPLOYMENT - HEALDSBURG PLANT[1]

Seasons	Alt. 1		Alt. 2		Alt. 3		Alt. 4		Alt. 5	
	Plant	Ind. Haul	Plant	Ind. Haul	Plant	Ind. Haul	Plant	Ind. Haul	Plant	Ind. Haul
1	44	40-50	66	75-100	58	66-88	57	66-88	53	48-79
2	44	40-50	74	84-112	66	75-100	62	69-93	53	48-79
3	44	40-50	66	75-100	64	75-100	57	66-88	53	48-79
4	44	40-50	70	78-104	62	69-93	57	66-88	53	48-79
5	44	40-50	65	75-100	59	66-88	57	66-88	53	48-79

1 For purposes of this analysis, all plant employment levels are assumed to be based on existing (1993) employment levels of 44 plant employees and 40 to 50 independent haulers. The number of independent haulers required under each activity level is based on the proportion of independent haulers to plant employees for 1990. Actual activity and employment levels would vary dependent upon market conditions and other factors beyond the scope of this analysis.

SOURCE: Syar Industries Inc., EIP Associates.

Project Impact

4.16-1 Implementation of any of the alternatives would result in increased employment activity in the Healdsburg area.

Mining sector employment within the Healdsburg area is a major component of the Healdsburg economy. Generally, an increase in the activity at the Healdsburg plant due to increased aggregate extraction would act as an economic incentive to the local economy. Employment of either plant personnel or independent haulers would have this effect. Increases in employment would tend to be locally important to the immediate Healdsburg area and residents. Within Sonoma County as a whole, however, the employment changes would tend to be relatively smaller, and have correspondingly less effect on the economy. As with any employment impact, the greater the number of new jobs created, the more beneficial the effect.

A-1 This alternative would not result in a substantial change in the number of persons employed. This is considered a ***less-than-significant impact.***

Under this alternative, employment levels would remain consistent with current employment trends at the Healdsburg plant. For purposes of this EIR/EIS, it is assumed that this alternative would not directly result in the loss of any jobs at the Healdsburg plant, but that overall market conditions would continue to dictate the operational levels

of the plant, as they do under existing conditions. As this would represent a continuation of existing conditions, there would be no adverse effect identified.

A-2 This alternative would result in an increase in employment of approximately 21 to 31 full-time plant employees. This would represent a ***beneficial impact.***

A-3 This alternative would result in an increase in employment of approximately 14 to 22 full-time plant employees. This would represent a ***beneficial impact.***

A-4 This alternative would result in an increase in employment of approximately 13 to 18 full-time plant employees. This would represent a ***beneficial impact.***

A-5 This alternative would result in an increase in employment of approximately 9 full-time plant employees. This would represent a ***beneficial impact.***

Mitigation Measures

4.16-1 *None required.*

Project Impact

4.16-2 Implementation of the alternatives could result in secondary effects on adjacent land uses, affecting their value and their owner's equity.

The presence of the Russian River in the project area is generally considered an amenity for adjacent properties, intrinsically increasing the values of the subject properties. Owners may take advantage of this increased value through equity loans and other financial means. The presence of intensive mining operations along the river has the potential to adversely affect the market value of these properties, which could lose scenic or aesthetic benefits as a direct result of the presence of heavy equipment required in mining operations. The effect is realized in actual financial terms only if the property is sold or appraised at a lower rate. The full amount of this loss would vary immensely by each property, and would be affected most by the perceptions of the individuals involved in the transaction.

The basis of this effect lies in the workings of the real estate marketplace. The values of real property such as land are dictated by a number of factors, which include the size of the property, the soil type, the presence of any structures (homes, buildings, etc.), crops (for agricultural land), availability of water, and the value of comparable properties for sale within the area. It is not, therefore, possible to identify any one characteristic of a property as being responsible for its market value. Property values are subject to the whims of the marketplace; therefore, the tastes of the individuals and firms making the transactions within that market. As a result, it is impossible to quantify the potential effect of any of the alternatives on the properties within the project area.

A-1 Implementation of this alternative would not result in a change in current mining operations or in the local economy; therefore, there would be no negative or positive effect on property values. This is considered a ***less-than-significant impact.***

A-2 through A-4

Implementation of these alternatives would result in increased mining intensities along the Russian River, potentially having an adverse effect on property values. As stated above, mining activity would be only one of many factors that would affect property values, and may have little or no effect. Since the potential effect cannot be predicted, this is considered a ***potentially significant and unavoidable impact.***

A-5 Implementation of this alternative would result in increased mining intensities along the Russian River, potentially having an adverse effect on property values, but would avoid intensive mining near Healdsburg. This is considered a ***potentially significant and unavoidable impact.***

Mitigation Measure

4.16-2 *None available.*

Project Impact

4.16-3 Implementation of the alternatives would affect local government revenues through property, sales and use taxes.

Local governments, such as the City of Healdsburg, Sonoma County, and various special districts and school districts, could experience incremental changes in revenues from property, sales and use tax sources as a direct result of the effects described in both Impact 4.16-1 and Impact 4.16-2, above. However, the effects of increased employment identified in Impact 4.16-1 would have a positive effect on local sales and use tax revenues, while the potential change in property values (Impact 4.16-2) could adversely affect local property taxes.

Since the passage of Proposition 13, property tax revenues have consistently been a smaller portion of the financing for local government operations, although they remain an important revenue source. Correspondingly, sales and use taxes have become an increasingly important source of funding for city and county governments. Under all of the alternatives assessed in this document, the countering effects of the increased employment and the potential for property value degradation represent largely self-canceling or self-minimizing effects. That is, the more intense the mining operations, the more employment and therefore the greater the revenues realized from sales and use taxes as well as other components of the local economy stimulated by the increased economic activity. However, the more intensive mining operations would also have a greater potential for degradation of adjacent property values, resulting in lower property tax revenues.

A-1 Implementation of this alternative would not result in a change from existing conditions with regard to local revenues. This is considered a ***less-than-significant impact.***

A-2 through A-5

Implementation of these alternatives would result in an increase in local revenues from sales and use taxes, but could have the potential to reduce property tax revenues. This is considered a ***less-than-significant impact.***

Mitigation Measure

4.16-3 *None required.*

ENDNOTES

1. David C. Spielberg, written communication dated March 19, 1993.

5. OTHER CONSIDERATIONS

5. OTHER CONSIDERATIONS

5.1 GROWTH INDUCEMENT

To comply with CEQA, a Draft EIR must discuss the ways in which the proposed project will affect economic and commercial growth in the vicinity of the project and how that growth will, in turn, affect the surrounding environment (CEQA Guidelines Section 15126g). Under CEQA, this growth is not to be considered necessarily detrimental, beneficial, or of significant consequence. NEPA (CFR 401508.8(b)) also requires analysis of indirect effects, including growth-inducing effects. Induced growth is considered a significant impact only if it directly (or indirectly) affects the ability of agencies to provide needed public services, or if it can be demonstrated that the potential growth, in some other way, significantly affects the environment.

Since the project would not result in a substantial number of new jobs or homes, its affect on growth would stem from providing an inexpensive source of aggregate, which is necessary for home and road construction. In order to produce affordable housing or roads, an area must have a source of reasonably priced building materials, including aggregate. Since the price of aggregate rises dramatically when it must be shipped any distance, a local source is generally a more inexpensive source. In this way, the location of aggregate mining operations may affect the price of housing and roads, which in turn may influence the attractiveness of an area and population growth. The proposed project would provide a relatively large source of aggregate to the County. Under the No Project Alternative, or, to a lesser extent, Alternatives 3 through 5, another source of aggregate may be required. If the project area were one of the only sources in the County, then the proposed project could be considered growth inducing. However, the County appears to have ample sources of gravel at present, and is developing a management approach for this resource by updating its Aggregate Resources Management Plan. Should the project area produce less gravel than proposed, it is likely demand could be met from other sources in the region, so that there would be little, if any, growth-inducing affect.

5.2 CUMULATIVE IMPACTS

Introduction

CEQA and NEPA require that an EIR/EIS contain an assessment of the "cumulative" impacts of the proposed project and project alternatives. This assessment involves examining project-related effects on the environment in combination with similar effects that have been caused by past or existing projects. Additionally, the anticipated effects of projects that are likely to occur in the foreseeable future must be considered.

This type of analysis is necessary because, although project-related impacts may be individually minor, the cumulative effects of these impacts in combination with the impacts of other projects could be significant [CEQA Guidelines, Section 15355 subd.(a) and (b) and NEPA 40 CFR 1502.16, 516 DM 4.14].

As stated in the 1990 *Guide to CEQA*, a legally adequate cumulative impacts analysis is "an analysis of a particular project viewed over time and in conjunction with other related past, present, and reasonably foreseeable probable future projects whose impacts might compound or interrelate with those of the project at hand."[1] The first step in such an analysis is to determine the types of impacts the project may have. The next step is to identify other past, present, and future projects that may have similar effects on the environment and may compound the impacts of the proposed project. The final step is to assess the significance of the combined effects of the proposed project and related projects on the environment. This section describes the cumulative impact analysis performed for this Draft EIR/EIS.

As shown in the preceding chapters, the six proposed reclamation plans and the mining operations associated with those plans have the potential for significant environmental effects in a number of areas. These include:

- Hydrology and Stream Channel Morphology
- Groundwater Supply and Quality
- Fish, Wildlife and Plant Resources
- Land Use
- Noise and Air Quality
- Traffic
- Recreation
- Visual Quality

The direct and indirect effects of the proposed project and project alternatives were evaluated, and the results of that evaluation presented in Chapter 4 of this Draft EIR/EIS.

As noted above, an assessment of cumulative impacts must consider the effects of other projects that have had or will have similar effects on the environment. The types of "other" projects considered in this analysis varied depending on the type of impact being evaluated. For example, in considering potential cumulative effects on streambed morphology, only those projects with potential to effect the stream channel (such as past and future instream mining operations and dam and bridge construction) were considered. In considering the potential cumulative effects on local groundwater conditions and future instream mining operations, past and future terrace mining operations were considered as well as instream operations.

A discussion of the methods employed for the assessment of cumulative impacts for each issue area is presented below. This discussion includes a description of other projects considered in the assessment, followed by a synopsis of the specific cumulative impacts that are identified and evaluated in Chapter 4 of this EIR/EIS.

Methods and Impacts

Stream Channel Morphology

In assessing the cumulative impacts on stream channel morphology, only those projects affecting instream resources were evaluated. These included (but were not limited to) instream structures, such as the Highway 101, City of Healdsburg, and Northwestern Pacific Railroad Bridges, Healdsburg, Warm Springs, and Coyote dams, and the temporary stream crossings that are constructed annually across the Russian River just north of Highway 101 and across Dry Creek just west of its confluence with the river. Additionally, past and future instream mining operations, both in and upstream of the project area, were taken into account, because of their potential effects on streambed degradation and the river's innate ability to replenish aggregate that is extracted from the river channel.

For purposes of defining cumulative instream conditions, it was assumed that instream mining operations upstream of the project area (i.e. in the Alexander Valley) will be limited to a maximum of 150,000 tons per year through 1998. This is consistent with preliminary recommendations proposed in the ARM Plan Update (1992). The long-term effects of past instream mining operations, as well as the effects of the construction of Coyote and Warm Springs dams, on the ability of the river to annually replenish aggregate supplies were assessed as part of the determination of estimated annual replenishment rates prepared by Phil Williams and Associates for the ARM Plan Update and Swanson and Associates (refer to Appendix C).

For purposes of this evaluation, it was assumed that the temporary haul road crossing of the Russian River just north of Highway 101 will continue to be constructed and removed seasonally to provide access from the west terrace and instream mining operations to Syar's aggregate processing plant, which are not part of the proposed project. This bridge has traditionally been constructed using aggregate materials as fill in the river channel, and diverting the river through a pair of concrete box culverts near the east bank. A bridge across the culverts is annually installed to provide access. It is assumed that this design will change to incorporate a second bridge crossing closer to the center of the river channel, and allow a reduction in necessary fill materials relative to past years. This design is shown in Figure 5-1 and has been submitted to the Army Corps of Engineers for processing of a Section 404 permit. This permit allows the placement of the required fill for construction of the crossing, and has been granted by the Corps for this year and 1993. In typical flow years the bridge structures will be removed following the excavation season and seasonal flood waters will wash out the crossing and redistribute the fill materials downstream. Reconstruction of the crossing will occur annually in the spring.

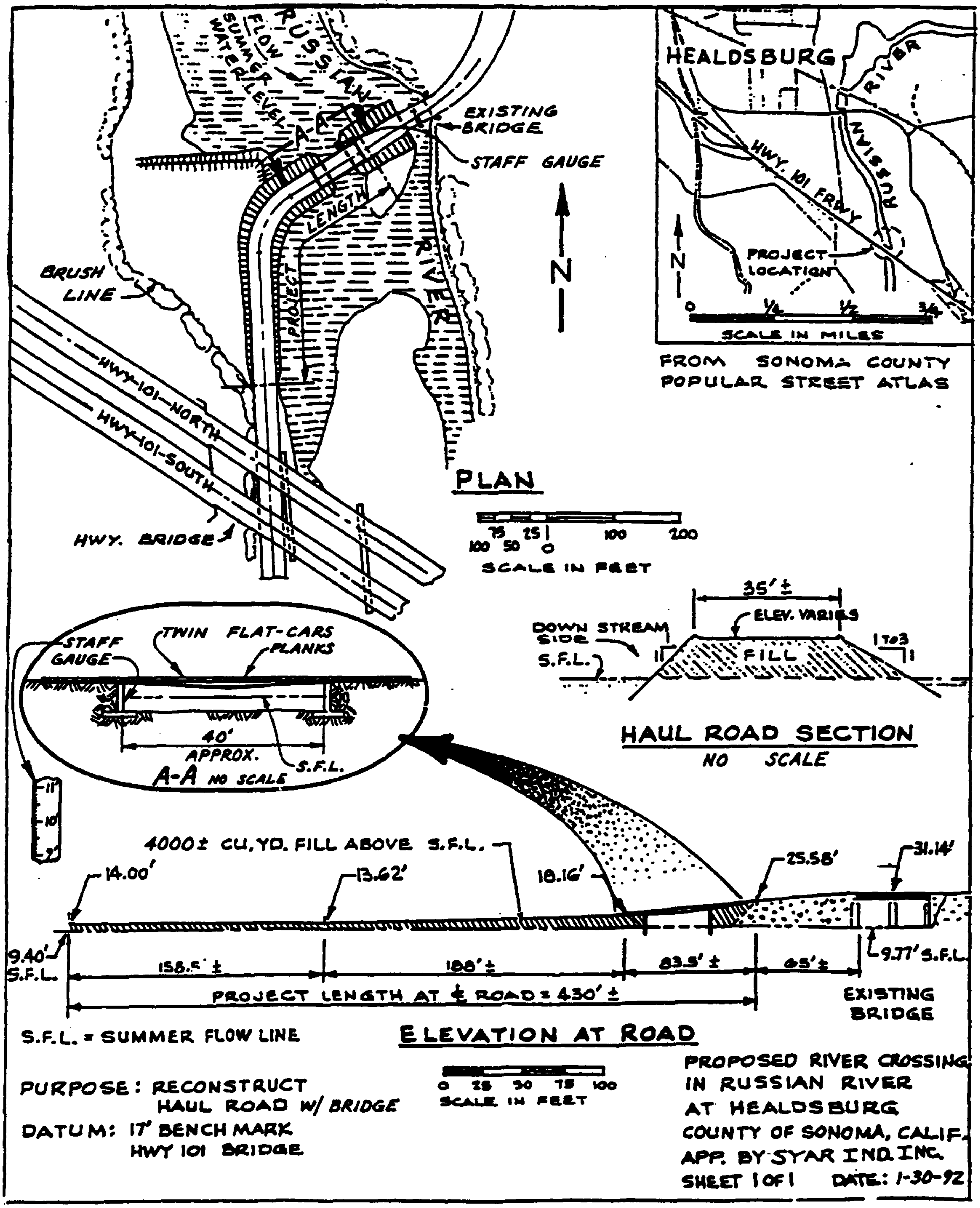

RUSSIAN
SUMMER WATER LEVEL
FLOW
EXISTING BRIDGE
STAFF GAUGE
A
A
PROJECT LENGTH
RIVER
N
BRUSH LINE
HWY-101-NORTH
HWY-101-SOUTH
HWY. BRIDGE
PLAN
100 75 50 25 0 100 200
SCALE IN FEET
HEALDSBURG
RIVER
HWY. 101 FRWY
RUSSIAN
N
PROJECT LOCATION
0 1/4 1/2 3/4
SCALE IN MILES
FROM SONOMA COUNTY POPULAR STREET ATLAS
STAFF GAUGE
TWIN FLAT-CARS
PLANKS
40' APPROX.
S.F.L.
A-A NO SCALE
35' ±
ELEV. VARIES
DOWN STREAM SIDE
S.F.L.
FILL
1 TO 3
HAUL ROAD SECTION
NO SCALE
4000± CU.YD. FILL ABOVE S.F.L.
14.00'
13.62'
18.16'
25.58'
31.14'
9.40' S.F.L.
158.5' ±
188' ±
83.5' ±
65' ±
9.77' S.F.L.
PROJECT LENGTH AT ℄ ROAD = 430' ±
EXISTING BRIDGE
S.F.L. = SUMMER FLOW LINE
ELEVATION AT ROAD
0 25 50 75 100
SCALE IN FEET
PURPOSE: RECONSTRUCT HAUL ROAD W/ BRIDGE
DATUM: 17' BENCH MARK HWY 101 BRIDGE
PROPOSED RIVER CROSSING IN RUSSIAN RIVER AT HEALDSBURG
COUNTY OF SONOMA, CALIF.
APP. BY SYAR IND. INC.
SHEET 1 OF 1 DATE: 1-30-92

Figure 5-1

The effects of the annual construction of the Russian River temporary crossing were assessed in the study *Geomorphic, Hydrologic, Hydraulic, and Fisheries Habitat Suitability Analysis of the Haul Road Crossing*, which was prepared for Syar Industries as a supplement to their Section 404 permit application. This study is presented in Appendix G. This information is supplemented by an assessment of siltation potential associated with the annual construction and washout of the crossing prepared by Swanson and Associates and presented in Section 4.3 of this EIR/EIS. The effects of annual placement of the crossing on instream conditions as described in these studies have been taken into account for the assessment of cumulative impacts of the alternatives.

Based on the above method, the following cumulative impact was identified for Alternatives 2 and 3:

> Instream extraction in the project reach would add to the accumulated sediment budget deficit in the Russian River Basin resulting from instream extraction upstream and from loss of sediment source areas by damming. This could result in bed degradation downstream and possibly accelerated bank erosion in the project reach and downstream of Wohler Bridge. This impact would be significant and unavoidable for Alternatives 2 and 3. (Impact 4.3-6)

No mitigation measures are available for this impact, so it is considered significant and unavoidable.

Ground Water Supply and Quality

Groundwater supply and movement within the study area can be affected by changes in stream channel morphology and changes to the river terrace. Past and projected instream projects and extensive terrace mining projects along the river south of Highway 101 affect the capacity and movement within local aquifers, and may affect local well production and groundwater quality. The terrace mining projects mentioned include currently inactive Syar Industries operations on the west side of the river at their Phase 1 and Grace Ranch pits (see Figure 5-2). These operations cover approximately 110 acres. A recent proposal to mine an additional 100,000 tons from the Grace Ranch pit (under an existing 1985 permit) has yet to be approved by the County. Syar Industries has mined approximately 110 acres on the west of the Middle Reach site. Additionally, Syar plans to pursue approval from the County to mine an additional 110 acres within the terrace area west of the river and south of their existing terrace operations.

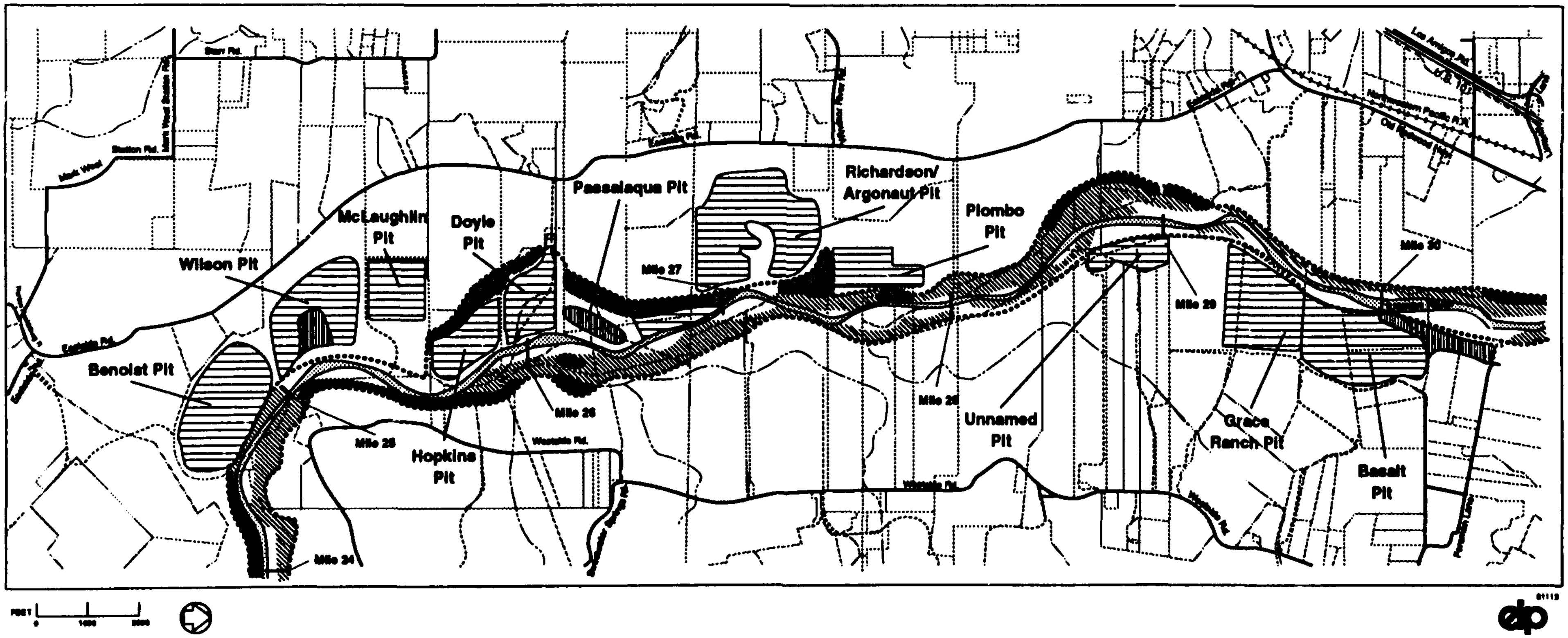
As of November 1991, Kaiser Sand and Gravel Company had mined approximately 528 acres east of the river.[2] Three "mined-out" Kaiser sites are the Richardson, Campbell and Wilson pits (see Figure 5-2). The Piambo Pit consists of approximately 45 acres that have been mined, but not to depth. The company intends to mine approximately 142 additional acres which have not yet been permitted. Preliminary plans concerning the eventual reclamation of the Kaiser terrace mining sites indicate that existing pits will be maintained as areas of open water and will be enhanced and maintained as areas for public recreation and as wildlife and fish habitat.[3] It is assumed that the mined-out Passalacqua Pit and Syar Industry's Doyle Pit (on the river's east side) will serve similar functions upon reclamation.

Russian River Middle Reach

Figure 5-2

LEGEND

•••••••••••	Edge of Riparian Zone	▬	Mature Riparian Forest (status 4 and 5)
▭	Existing Terrace Mining Sites	▨	Developing Riparian Forest (status 2 and 3)
▥	Sites Refilled Above Water Level	□	Open Areas and Immature Vegetation (status 0 and 1)



Kaiser Sand and Gravel Company has pending applications to mine an additional 86 acres of terrace east of the river. These applications involve the approximately 25-acre site adjacent to the Piombo Pit currently occupied by the Company's aggregate processing plant, and 61 acres adjacent to the eastern border of the existing Piombo Pit. In addition, Syar industries has applied to mine 30 acres adjacent to their Grace Ranch Pit. For purposes of this cumulative impacts assessment, it is assumed that all terrace sites (totaling approximately 116 acres) for which mining permit applications have been submitted to the County will be mined in the foreseeable future.

Groundwater supplies can also be affected by degradation of the streambed. Potential effects can result from reductions in water surface elevations and subsequent reductions in aquifer recharge or potential losses in the natural filtering capacity of streambed aggregate for nearby wells. The assumptions made in this EIR/EIS concerning cumulative effects of streambed degradation are listed above in the discussion of stream channel morphology.

The following cumulative impact was identified for Alternatives 2 through 4:

> Pit excavation at the Doyle site would contribute to a reduction in transit time for groundwater flow down the valley, and the time it takes to flush the aquifer if a contaminant were introduced. This impact would be significant and unavoidable for Alternatives 2 through 4. (Impact 4.5-9)

Measures to reduce the severity of this impact are not available; however, not to a less-than-significant level.

Fisheries

Projects that change stream channel morphology also have the potential to affect fish resources. Therefore, projects listed above under the discussion of stream channel morphology and their potential direct and indirect effects on fish resources were considered during the cumulative analyses of fisheries impacts. These effects were taken into account in determining the significance of project-specific impacts, such as increased turbidity associated with gravel bar mining, and cumulative impacts, such as the region-wide loss of spawning gravels and reductions in reductions in riffle habitat.

Based on the methods described above, Alternatives 2 through 4 were found to have the following cumulative impact:

> The combined effects of increased sedimentation, habitat loss or degradation, stream diversion, pool excavation, and potential stranding caused by reclamation and mining operations proposed for the study area could adversely affect populations of resident and migratory fish species. This impact is significant and unavoidable for Alternative 2, and significant for Alternatives 3 and 4. (Impact 4.6-10)

The mitigation measures identified in Section 4.6 would reduce the severity of this impact. These measures include pool monitoring, schedules for placement of diversion dams, fish rescue operations, rearmoring excavated gravel bars, location of topsoil stockpiles, and the use of railroad flat car stream crossings. For Alternatives 3 and 4, the impact could be reduced to a less-than-significant level. While the severity of the impact could be reduced for Alternative 2, it would remain significant due to proposed channel modification procedures associated with that alternative.

Terrestrial Biological Resources

The primary impacts of the proposed project on terrestrial animals and plants are associated with the potential loss or disturbance of riparian vegetation. As discussed in Section 4.7 of this Draft EIR/EIS, since the mid-1800's much of the riparian forest that existed within the floodplain of the Russian River has been cleared for agriculture, mining, logging and urban development. Presently, only a thin discontinuous strip of the former forest band remains along the river. Additionally, aerial photography from 1945, 1952 and 1958 shows that the river channel within the study area at one time had a significantly more meandering pattern, which tends to support habitat that is more diverse and productive than that associated with straighter, more channelized systems. The photographs also show large patches of riparian forest existed between vineyards and other agricultural lands, in some cases extending up to a mile or more from the riverbank. These patches have, for the most part, been eliminated to accommodate expansion of agricultural operations.

Regionwide reductions in the availability of riparian habitat have led to the decline in abundance of several animal and plant species that rely on this type of habitat for food, cover, and/or breeding. Some of these declines have led to the listing of some species as threatened, endangered, or of special concern. These species are discussed in Section 4.7.

Historic losses of riparian habitat and resulting impacts on the abundance of related species were taken into consideration in determining the significance of cumulative impacts of the alternatives on terrestrial biological resources.

Section 4.7 identifies the loss of riparian habitat within the project area as a significant impact for Alternatives 2 through 4 when considered in the context of regional losses. This impact could be reduced, but not to less-than-significant levels, by replacing any habitat lost with the same or a greater number of acres of riparian habitat on site. Alternative 5, which would eventually increase the amount of riparian habitat, is considered to have a beneficial cumulative impact (see Impact 4.7-8).

Land Use

As discussed in Section 4.8, the primary cumulative land use impact associated with the alternatives concerns the potential loss of prime farmland. Only Alternative 5, the Streamway Alternative, has been identified as having potentially significant effects on prime farmland.

According to the 1980 ARM Plan, 3,852 acres of prime soils (Class I and II) are within the "Middle Reach", which encompasses the proposed project site. Within that area, terrace mining operations have excavated roughly 628 acres. Applications have been submitted to the County to mine an additional 116 acres.[4] For purposes of this EIR/EIS, it is assumed that most if not all of the operations listed above have occurred on lands suitable for productive agriculture. It is also assumed that reclamation of the sites as productive agricultural lands is highly unlikely for a number of reasons, including the impracticality of timely infill of excavated pits through sedimentation from periodic high river flows, and questions concerning the fertility of stockpiled topsoil, which would be used to resoil excavated areas once adequate infill had occurred.

These losses and potential losses are taken into consideration in the assessment of potential cumulative land use impacts of the alternatives. For Alternative 5 only, the loss of prime farmland is considered a significant and unavoidable impact (see Impact 4.8-8).

Visual Quality, Recreation, Cultural Resources and Public Health and Safety

Past and future instream mining operations, terrace mining operations, agricultural operations, and existing instream structures discussed in the preceding pages of this section were taken into account in the determination of the cumulative impacts of the proposed project and project alternatives on visual quality, recreational opportunities, cultural resources and public health and safety within the project study area.

No cumulative impacts were identified for cultural resources or public health and safety. Under Alternatives 2 through 5, cumulative changes to views in the project vicinity would be considered significant and unavoidable (see Impact 4.9-8). Project-related obstructions to water-borne craft are considered significant under Alternatives 2 through 4, because of the use of stream crossings (see Impact 4.10-7). This impact would be reduced to a less-than-significant level with the following mitigation measure:

> *Temporary in-stream crossings that are otherwise impassible to water-borne craft shall be designed and constructed so that water-borne craft may be portaged around or over the obstruction. Portage locations shall be clearly identifiable by river travellers, and shall include pathways that permit visibility along the haul road by vehicles and equipment, and have banks or shoulders that are sloped gently enough to permit portage by canoes and drift boats. Such crossings shall be inspected regularly by the Sonoma County Regional Park Department to determine the safety and adequacy of the portage locations. (Mitigation Measure 4.10-1)*

Transportation, Air Quality, and Noise

Countywide traffic conditions and the effects of truck traffic generated by the aggregate mining and processing industry on those conditions were recently evaluated by the Crane Transportation Group. Their report, *Technical Report for the Sonoma County Aggregate Resources Management Plan and EIR*, was used as the basis for analyzing the cumulative effects of the alternatives on local and regional traffic conditions. Only those impacts associated with mining operations, the

movement of vehicles between the mining sites and the processing plants, and the importation of spur construction materials were evaluated. The effects of the No Project Alternative on potential increases in the importation aggregate to the area currently supplied by the study area and regional traffic conditions are addressed based on information provided in the Crane Transportation Group report.

Dust and vehicular emissions generated as a result of mining and reclamation operations were evaluated in light of existing background conditions in the region surrounding the project area.

Background noise levels associated with the existing processing plant, local traffic, and other existing and potential mining operations in the study area were considered in the evaluation of cumulative noise generated by the alternatives.

Because the noise analysis must incorporate existing and expected noise levels in the vicinity, cumulative and project impacts are combined. As discussed in Section 4.14, significant and unavoidable noise impacts would occur during mining and reclamation operations at the Healdsburg Bendway and Riverbend sites (Impacts 4.14-5 and 6).

When considered with other operations, all of the alternatives are expected to have significant and unavoidable effects on local air quality. Under Alternative 1 only, increased traffic congestion would be a cumulatively significant impact, which could be reduced to a less-than-significant level with the following mitigation measure:

> *Sonoma County shall implement an updated Aggregate Resources Management Plan that effectively relies on production of aggregate from sources other than the Middle Reach of the Russian River, and which would help reduce existing and anticipated traffic conditions within the County. This is required for Alternative 1, the No Project Alternative. (Mitigation Measure 4.12-1)*

5.3 SIGNIFICANT UNAVOIDABLE IMPACTS

This section summarizes impacts that could not be reduced to less-than-significant levels through mitigation (NEPA, 40 CFR §1502.16 and CEQA Guidelines §15126b). The final determination of the significance of impacts and the feasibility of mitigation measures will be made by the lead agencies when they certify and adopt this EIR/EIS.

The following impacts would result from implementation of the alternatives noted. As stated in specific chapters, some of these impacts could be reduced in magnitude, but not to less-than-significant levels.

Hydrology and Channel Dynamics (See Section 4.3)

Under Alternatives 2 and 3, instream extraction in the project area would add to the accumulated sediment budget deficit in the Russian River Basin. (Impact 4.3-1)

Project-specific and cumulative bed degradation under Alternatives 2 and 3 could also destabilize channel banks, causing loss of floodplain property between the Riverbend site and the USGS Bailhache gage (RM 35), and along with pool excavation below Healdsburg Dam, and increase bank erosion. (Impacts 4.3-3 and 4.3-4)

Under Alternatives 2 through 4, the Doyle Pit would be excavated below the river bed elevation, which, if combined with loss of the bank between the pit and the river due to lateral erosion, could result in capture of the river channel by the pit, and substantial upstream degradation and erosion. (Impact 4.3-5)

<u>Groundwater</u> (See Section 4.5)

Under Alternatives 2 and 3, groundwater production could be reduced or eliminated at private wells upstream of or near the Healdsburg Bendway, or where the aquifer has only 10 to 30 feet saturated aquifer thickness. (Impacts 4.5-3 and 4.5-5)

Under Alternatives 2 through 4, pit excavation at the Doyle site would reduce transit time for groundwater flow down the valley and the time it takes to flush the aquifer if contaminants were introduced. (Impact 4.5-9)

<u>Fish Resources</u> (See Section 4.6)

The deep pools created by excavation under Alternative 2 could increase the vulnerability of outmigrating anadromous fish and the Russian River tule perch to predation. (Impact 4.6-1)

Under Alternative 2, the elimination of areas of riffle habitat and large substrates (i.e. materials greater than 6 inches in diameter) from bars may adversely affect survival of juvenile fish and the production of aquatic invertebrates. (Impact 4.6-6)

Maintaining the pit at the Doyle site could entrap migrating salmonids under Alternatives 1 through 5. (Impact 4.6-8)

Under Alternative 2, the combined effects of increased sedimentation, habitat loss or degradation, stream diversion, pool excavation, and potential stranding caused by reclamation and mining operation proposed for the study area could adversely affect populations of resident and migratory fish species. (Impact 4.6-10)

<u>Terrestrial Biological Resources</u> (See Section 4.7)

Under Alternatives 2 through 4, mining and reclamation activities could result in the loss of riparian habitat. (Impact 4.7-1)

A lowered groundwater table could reduce riparian vegetation and cover under Alternatives 2 and 3. (Impact 4.7-6)

Alternatives 2 through 4 could contribute to a cumulative loss of riparian habitat. (Impact 4.7-8)

Land Use (See Section 4.8)

Mining and reclamation activities occurring under Alternatives 2 through 5 could subject neighboring residences to noise, dust and visual impacts. (Impact 4.8-1)

Under Alternative 5, prime farmland could be lost to mining and reclamation. (Impacts 4.8-7 and 4.8-8)

Visual Quality (See Section 4.9)

Under Alternatives 2 through 5, negative aesthetic experiences could be created for sensitive receptors in rural areas and the City of Healdsburg. (Impacts 4.9-1 and 4.9-2)

Alternatives 2 and 3 would not promote some of the City of Healdsburg General Plan goals and policies. (Impact 4.9-4)

Under Alternative 2, the construction of spurs at the Healdsburg Bendway would alter the visual characteristics of the site. (Impact 4.9-5)

Alternatives 2 through 5 would contribute to cumulatively significant changes to views in the project area. (Impact 4.9-8)

Recreation (See Section 4.10)

Alternatives 2 through 4 would degrade the recreational value of the Russian River in the vicinity of the project area. (Impact 4.10-4 and 4.10-5)

Climate and Air Quality (See Section 4.13)

Under all alternatives, air pollutant emissions related to mining and reclamation could have adverse cumulative effects on local air quality. These air quality impacts could be reduced, but not to a less-than-significant level. (Impact 4.13-2)

Noise (See Section 4.14)

Alternatives 2 and 3 would create significant unacceptable noise levels around the Healdsburg Bendway and Riverbend sites for the period of mining on those sites. The noise levels could be reduced in magnitude through mitigation, but not to a less-than-significant level. (Impacts 4.14-5 and 4.14-6)

Socioeconomic Concerns (See Section 4.16)

Under Alternatives 2 through 5, secondary effects on adjacent land uses could effect their value. (Impact 4.16-2)

5.4 SIGNIFICANT IRREVERSIBLE EFFECTS

Under CEQA and NEPA, an EIR/EIS must analyze the extent to which a plan's primary and secondary effects would commit resources to uses that future generations will probably be unable to reverse [CEQA Guidelines Section 15126(f) and 15127, and CEQA Section 21000(f); NEPA 40 CFR §1502.16].

Different forms of aggregate mining have different levels of replenishment, so the degree to which the effects of mining are irreversible depends on the type, amount and location of mining. Terrace mining, such as that proposed for the Doyle site in Alternatives 2 through 4 and at the Middle Reach site for Alternative 5, is relatively permanent. The gravel terrace is not likely to be replaced in the near future. Therefore, the gravel excavated in the near future will not be available in the distant future.

In addition, terrace mining requires the removal of, in the case of the Doyle site, riparian habitat, or, with the Middle Reach site, agricultural land. Terrace pits may be filled once mining is complete, and, theoretically, the original use restored. Riparian habitat disturbed during mining operations may be reestablished under the right conditions. The fate of agricultural land is less certain. To date, efforts to return mining areas to agricultural productivity have not been shown to work. The loss of agricultural land could be a significant irreversible impact under Alternative 5.

Instream mining is far more likely to be a renewable activity than terrace mining. Every winter the river's flow increases, bringing with it gravel, which is deposited in the channel and on adjacent gravel bars. So long as instream extraction does not exceed replenishment repeatedly, the river should continue to be a source of aggregate.

5.5 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

CEQA requires that an EIR include an analysis of impacts that would tend to "narrow the range of beneficial environmental uses or pose long-term risks to public health and safety" [CEQA Guidelines Section 15126(e); CEQA Section 21100(e)]. NEPA (40 CFR §1502.16) requires that an EIS evaluates the relationship between short-term uses of the environment and enhancement of long-term productivity.

The short-term use of the project site is the production of a local, relatively inexpensive source of gravel for the construction of the homes and infrastructure necessary to support the County's

existing and future populations. The long-term effects of terrace mining include potential reductions in groundwater recharge and, in the cumulative context, interference with the movement of water between the river and the adjacent aquifer. To the extent that it can cause the river bed to degrade, in-stream mining could result in long-term destabilization of dams and bridges and reduced groundwater recharge, as well as long-term degradation of fisheries.

5.6 ENVIRONMENTALLY SUPERIOR/PREFERRED ALTERNATIVE

CEQA Guidelines Section 15126(d)(2) requires that an EIR must identify an environmentally superior alternative. If that alternative is the no project alternative, then "the EIR shall identify an environmentally superior alternative among the other alternatives." NEPA [40 CFR 1505.2(b)] also requires that an environmentally preferred alternative be designated in an EIS.

The environmental consequences of implementing the No Project Alternative for this Draft EIR/EIS are certainly not negligible. It is assumed that sufficient aggregate supplies will still need to be made available to the consumption area potentially served by the proposed project. There would be significant environmental impacts associated with the excavation, processing and transport of aggregate to meet the demand that would otherwise be met by the proposed project. Indeed, excavation of such supplies in a similarly sensitive environment and the necessary additional transport of materials to local processing plants or construction sites may cause greater harm to the environment than the proposed action. It may also be assumed that the cost of aggregate in the project area would increase due to increased transport costs.

Due to the high environmental value of the river and its vulnerability to impact, however, alternative supplies of aggregate may be appropriated and transported with less environmental effect than any of the other alternatives. This conclusion is based on preliminary results of the ARM Plan Update studies, which indicate that an expansion of quarry mining operations within Sonoma County may produce an adequate supply of aggregate to help meet foreseeable needs of the County with greatly reduced impacts relative to the instream and terrace mining operations.[5]

Of the remaining alternatives (Alternatives 2 through 5), Alternative 5 (the Floodplain Skimming/Streamway Development Alternative) was determined to be environmentally superior. The rational for this conclusion is discussed below.

Of the three alternatives (Alternative 2, 3, and 4) involving instream mining and development of the Doyle Pit site, Alternative 4 is clearly superior from an environmental standpoint. This is primarily due to the alternative's avoidance of continued degradation of the Russian River streambed. Significant streambed degradation would be anticipated with the implementation of either Alternative 2 or 3. However, Alternative 4 would result in several significant and unavoidable impacts on various environmental resources that would not occur under Alternative 5. These include the potential for capture of the river channel with continued development of the Doyle site; potential reductions in groundwater transit times associated with the Doyle site; cumulative impacts on fish resources associated with instream mining and reclamation activities;

cumulative loss of riparian habitat; and the cumulative effect of instream operation on recreational activities in the river.

Several additional significant impacts on environmental resources were identified that would require mitigation under Alternative 4 to reduce potential impacts to a less-than-significant level. These impacts would be avoided under Alternative 5, and include potential erosion on the Doyle Pit; potential hindrances to groundwater movement near the Doyle site; the effects of riparian and riffle habitat removal on fish; the effects of placement of streamcrossings in the river channel; potential impacts on sensitive amphibian species; and cumulative impacts on river navigation.

It is important to note that Alternative 5 would result in a significant and unavoidable loss of prime farmland. The conversion of prime farmland to mining operations is an extremely contentious issue in Sonoma County. Additionally, several unresolved issues concerning the feasibility of implementing Alternative 5 exist. These unanswered questions include:

- Is it possible for Syar to acquire the land needed to implement Alternative 5?
- Would it be possible to acquire all necessary entitlements to mine and reclaim the proposed site given that no vested rights currently exist for mining the property?
- Would an amendment to the County's Aggregate Resources Management Plan be required to implement the alternative?

Nevertheless, based on the results of the environmental evaluation presented in Section 4, Alternative 5 has been determined to be environmentally superior to Alternatives 2, 3, and 4.

ENDNOTES

1. Remy, M.H., T.A. Thomas, S.E. Duggan, and J.G. Moose. 1990. *Guide to the California Environmental Quality Act.*

2. Kaiser Sand and Gravel Company. November 1991. *Windsor Lakes Concept Plan: An Amendment to the Sonoma County Aggregate Resources Management Plan.*

3. Ibid.

4. Gaiser, R. Sonoma County. Personal communication. July 9, 1992.

5. Jordan, J. EIP Associates, San Francisco office. Personal communication. April 14, 1992.

6. GLOSSARY

6. GLOSSARY

Aggradation (bed) A progressive buildup or raising of the channel bed due to sediment deposition. Permanent or continuous aggradation is an indicator that a change in the stream's discharge and sediment load characteristics is taking place.

Alluvial channel Channel wholly in alluvium; no bedrock is exposed in channel at low flow or likely to be exposed by erosion. A channel whose processes are controlled by the flow and boundary interactions.

Alluvial fan A landform shaped like a fan in plain view and deposited where a stream issues from a narrow valley of high slope onto a plain or broad valley of low slope.

Annual Flood The maximum flow in one year (may be daily or instantaneous).

Armoring (a) Natural process whereby an erosion-resistant layer of relatively large particle is formed on a streambank due to the removal of finer particles by streamflow. (b) Placement of a covering on a streambank to prevent erosion.

Armour Surfacing of channel bed, banks, or embankment slope to resist erosion.

Backwater The increase in water surface elevation relative to the elevation occurring under natural channel and floodplain conditions, induced upstream from a bridge or other condition that obstructs or constricts a channel.

Bank The side slopes of a channel between which the stream-flow is normally confined.

Bar An elongated deposit of alluvium, not permanently vegetated, within or along the side of a channel.

Bed The bottom of a channel.

Bed Load Sediment that is transported in a stream by rolling, sliding, or skipping along the bed or very close to it; considered to be within the bed layer.

Bed Load Discharge (or bed load) The quantity of bed load passing a cross section of a stream in a unit of time.

Bed Material Material found on the bed of a stream (may be transported as bed load or in suspension.

Bedrock The solid rock underlying soils and overlying the mantle rock, ranging form surface exposure to depths of several hundred feet.

Braid A subordinate channel of a braided stream.

Braided Stream A stream whose flow is divided at normal stage by small mid-channel bars or small islands; the individual width of bars and islands is less than about three times the water width; a braided stream has the aspect of a single large channel within which there are subordinate channels.

Channel The bed and banks that confine the surface flow of a natural or man-made stream; braided streams have multiple subordinate channels that are within the main stream channel and branched streams have more than one channel.

Channel Diversion The removal of flows by natural or artificial means from a natural length of channel.

Channelization Straightening or deepening of a natural channel by artificial cutoffs, grading, flow-control measures, or diversion of flow into an artificial channel.

Clay Material passing the No. 200 (0.074 mm) U.S. Standard Sieve that exhibits plasticity (putty-like properties) within a range of water contents and has considerable strength when air-dry (Unified Soil Classification System).

Confluence The junction of two or more streams.

Constriction A control section, such as a bridge crossing, channel reach or dam, with limited flow capacity in which the discharge is related to the upstream water surface elevation; a constriction may be either natural or artificial.

Current Water flowing through a channel.

Cut Bank The concave wall of a meandering stream.

Degradation (bed) A progressive lowering of the channel bed due to scour. Permanent or continuing degradation is an indicator that a change in the stream's discharge and sediment load characteristics is taking place.

Depth of Scour The vertical distance a streambed is lowered by scour below a reference elevation.

Discharge Volume of water passing through a channel during a given time.

Drainage Basin An area confined by drainage divides, often having only one outlet for discharge.

Environmental Pertaining to the effects of engineering works on their surroundings and on nature.

Erosion Displacement of soil particles on the land surface due to water or wind action.

Fill-Slope Side or end slope of an earth-fill embankment. Where a fill-slope forms the streamward face of a spillthrough abutment, it is regarded as part of the abutment.

Fine Sediment Load (or Washload) That part of the total sediment load that is composed of particle sizes finer than those represented in the bed. Normally the fine-sediment load is finer than 0.062 mm for a sand-bed channel. Silts, clays and sand could be considered as wash load in coarse gravel and cobble bed channels.

Flood-Frequency Curve A graph indicating the probability that the annual flood discharge will exceed a given magnitude, or the recurrence interval corresponding to a given magnitude.

Floodplain A nearly flat, alluvial lowland bordering a stream, that is subject to inundation by floods.

General Scour Scour in a channel or on a floodplain that is not localized at a pier, abutment, or other obstruction to flow. In a channel, general scour usually affects all or most of the channel width.

Geomorphology That branch of both physiography and geology that deals with the form of the earth, the general configuration of its surface, and the changes that take place due to erosion of the primary elements and in the buildup of erosional debris.

Gravel Particles, usually of rock, whose diameter is between 2 and 64 mm. The term gravel is also applied to a mixture of sizes (gravel with sand or gravel with cobbles) in which the dominant or modal fraction is the gravel size range.

Historical Flood A known flood event predating systematic flow measurements at a given site.

Hydrology The science concerned with the occurrence, distribution and circulation of water on and in the earth.

Island A permanently vegetated area, emergent at normal stage, that divides the flow of a stream. Some islands originate by the establishment of vegetation on a bar, and others originate by channel avulsion or at the junction of minor tributaries with a stream.

Jetty An alternative term for a "spur".

Lateral Erosion Erosion in which the removal of material has a dominantly lateral component, as contrasted with scour in which the component is dominantly vertical.

Load (or sediment load) Amount of sediment being moved by a stream.

Local Scour Scour in a channel or on a flood plain that is localized at a pier, abutment, or other obstruction to flow.

Lower Bank That portion of a streambank having an elevation less than the mean water level of the stream.

Meandering Channel A channel exhibiting a characteristic process of bank erosion and point bar deposition associated with systematically shifting meanders.

Meandering Stream A stream having a sinuosity greater than some arbitrary value, herein placed at 1.25. The term also implies a moderate degree of pattern symmetry, imparted by regularity of size and repetition of meander loops.

Mid-Channel Bar A bar lacking permanent vegetal cover that divides the flow in a channel at normal stage.

Middle Bank That portion of a streambank having an elevation approximately the same as that of the mean water level of the stream.

Migration (of bed forms or meanders) Systematic shifting in the direction of flow.

Overbank Flow Water movement over top bank either due to a rising stream stage or to inland surface water runoff.

Point Bar An alluvial deposit of sand or gravel lacking permanent vegetal cover occurring in a channel at the inside of a meander loop, usually somewhat downstream form the apex of the loop.

Reach A segment of stream length that is arbitrarily bounded for purposes of study.

Revetment Rigid or flexible armor placed on a bank or embankment as protection against scour and lateral erosion.

Riffle A natural shallow flow area extending across a streambed in which the surface of flowing water is broken by waves or ripples. Typically, riffles alternate with pools along the length of a natural stream channel.

Riparian Pertaining to anything connected with or adjacent to the banks of a stream.

Riprap In the restricted sense, layer or facing of broken rock or concrete dumped or placed to protect a structure or embankment from erosion; also the broken rock or concrete suitable for such use. Riprap has also been applied to almost all kinds of armor, including wire-enclosed riprap, grouted riprap, sacked concrete, and concrete slabs.

Runoff See Discharge.

Scour Erosion due to flowing water; usually considered as being localized as opposed to general bed degradation.

Scoured Depth Total depth of the water from water surface to a scoured bed level (compare "depth of scour").

Sediment (or fluvial sediment) Fragmental material transported, suspended, or deposited by water.

Sediment Concentration (by weight or by volume) Weight or volume of sediment transported by a stream in a unit of time. Discharge may be limited to certain sizes of sediment or to a specific part of the cross section.

Sediment Yield The total sediment outflow from a watershed or a drainage area at a point of reference and in a specified time period. This outflow is equal to the sediment discharge from the drainage area.

Seepage The slow movement of water through small cracks and pores of the bank material.

Silt Materials passing No. 200 (0.074 mm) U.S. Standard Sieve that is nonplastic or very slightly plastic and exhibits little or no strength when air-dried (Unified Soil Classification System).

Spur A permeable or impermeable linear structure that projects into a channel from the bank to alter flow direction, induce deposition, or reduce flow velocity along the bank.

Stable Channel A condition that exists when a stream has the bed slope and cross-section which allows its channel to transport the water and sediment delivered from the upstream watershed without aggradation, deposition or streambank erosion.

Stage Water-surface elevation of a stream with respect to a reference elevation.

Storm Surge Oceanic tide-like phenomenon resulting from wind and barometric pressure changes.

Stream A body of water that may range in size from a large river to a small rill flowing in a channel. By extension, the term is sometimes applied to a natural channel or drainage course formed by flowing water whether it is occupied by water or not.

Streambank Erosion Removal of soil particles or a mass of particles from a bank surface due primarily to hydraulic action. Other factors such as weathering, ice and debris abrasion, chemical reactions, and land use changes may also directly or indirectly lead to streambank erosion.

Streambank Failure Sudden collapse of a bank due to an instability condition such as removal of the bank by scour.

Streambank Protection Any technique used to prevent erosion or failure of a streambank.

Thalweg The line extending down a channel that follows the lowest elevation of the bed.

Total Sediment Discharge The sum of suspended-sediment discharge and bedload discharge or the sum of bed material discharge and washload discharge of a stream.

Total Sediment Load (of total load) The sum of suspended load and bedload or the sum of bed material load and washload of a stream.

Vegetation Woody or nonwoody plants used to stabilize a streambank and retard erosion.

Velocity, Cross-Sectional Average Discharge divided by cross-sectional area of flow.

Velocity The rate of motion of a stream or of the objects or particles transported therein, usually expressed in distance per time.

7. LIST OF PREPARERS

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Name/Section(s)	Background
Mary Jane Boxer Sections: Geology and Soils; Public Health and Safety	Geologist for EIP; B.S. in Geology; background in hydrologic studies, groundwater flow determination, water sampling and plume characterization, and well installations. 3 years with ERM West, Inc.; 1 year with EIP Associates.
Eleanor Derr Section: Cultural Resources	B.A. in Anthropology, M.A. in Anthropology/Archaeology. Owner and Principal Investigator of Cultural Resources Unlimited since 1988. Projects have included water and sewer conveyance systems, subdivision and golf course developments, large-area sensitivity studies for land use planning, site augering and test excavation, data collection studies, field work at Lake Britton in Shasta County and in Fresno County.
Adrienne Graham Deputy Project Manager; Sections: Project Description, Other CEQA and NEPA Considerations	Environmental Analyst for EIP; deputy project manager for EIRs evaluating small and large residential and mixed use development, aggregate mining, university projects, and wastewater treatment plant expansions. Prepared public service, visual, land use and other technical sections for same, along with mitigation monitoring programs.
Rick Hanson Project Manager; Sections: Project Description; Fish Resources; Terrestrial Biological Resources; Other CEQA and NEPA Considerations.	Associate Planner; Fisheries and Wildlife Biologist. B.S. in Zoology; M.S. in Biological Sciences with a specialization in fisheries management. Fourteen years of experience in the design, preparation, and management of environmental impact studies. Certified in Habitat Evaluation Procedures (HEP) by the U.S. Fish and Wildlife Service. Has performed Instream Flow Incremental Methodology (IFIM) data analyses. Has managed of several past and ongoing mining-related projects. From 1976 to 1983, participated in the Interagency Ecological Studies Program involving the study of the Sacramento/San Joaquin Delta and San Francisco Bay Estuary; performed fisheries research and water quality evaluations throughout the system. For the past eight years, has prepared and managed Initial Studies, Environmental Assessments, FONSIs, Negative Declarations, Biological Assessments, Wildlife Coordination

Name/Section(s)	Background
	Act Reports, Environmental Impact Reports and Statements, and has assisted in the preparation of applications for Stream Alteration, NPDES, and Section 404 permits; performed field surveys and technical analyses for these documents.
Bronwyn C. Hogan Section: Terrestrial Biological Resources	Biologist; Bachelor of Science degree in Wildlife Biology. Conducts biological resource surveys, including special status species surveys, biological constraints analyses and report preparation, habitat mapping using the California Wildlife Habitat Relationships system, and aerial photograph interpretation. Worked as a district biologist for the U.S. Forest Service on the Eldorado National Forest. Duties included conducting wildlife surveys and preparing biological reports for environmental assessments and other NEPA documents and developing monitoring plans.
Julie Horenstein Section: Terrestrial Biological Resources	Botanist/Plant Ecologist; M.S. degree in Biology, with an emphasis in Ecology, B.A. in Biology. Specialized expertise in biological resource surveys, emphasis on rare plant surveys. Has conducted plant community ecology research in coastal sage scrub, grasslands, vernal pools, chaparral, desert, and coniferous forest. Has prepared wetland delineations, biological sections of Environmental Impact Reports, biological constraints analyses, project mitigation planning, wetlands-related permits, and monitoring of permit compliance.
James R. Lang Sections: Recreation; Socioeconomic Concern	Economist/Planner; B.A. Economics; Candidate for the Master's Degree in Public Administration. Experienced in the application of statistical and mathematical models. For California State University new campus site, developed a population distribution model based on a traffic engineering report to predict future locational effects of population growth on public services; has developed models to evaluate the conversion of agricultural and industrial lands to residential use; has worked with existing municipal-specific fiscal models; has extensive experience performing public service evaluation and impact analysis at regional, county and municipal levels. Has performed service evaluations on the reconfiguration or new construction of utility infrastructure. Has conducted socioeconomic analyses for several large redevelopment areas.

Name/Section(s)	Background
Kendra Matlock Sections: Land Use; Traffic	Environmental Analyst; B.S. in Landscape Architecture. Has been involved in the preparation of EIRs on residential and mixed-use developments. Other experience includes preparation of the Land Use, Transportation, Visual Resources, and Public Safety sections of EIRs/EISs. Served as an associate planner for a land use planning and environmental consulting fire; was involved in various urban design and landscape architecture projects.
Mitchell Swanson Sections: Hydrology and Channel Dynamics; Water Quality; Groundwater	Independent consultant with Mitchell Swanson & Associates; over nine years of consulting experience in hydrology, geologic hazards, and geomorphology. M.S. in Earth Sciences; B.S. in Earth Sciences. Specializes in development of management and restoration plans for rivers, estuaries and watersheds. Extensive expert witness experience before Water Resources Control Board and California Superior Court. Expertise includes historical geomorphic and hydrologic studies for geologic hazards assessments, and determining the causes and effects of human modification on hydrologic and geomorphic systems. Extensive field experience in hydrologic measurement and geomorphic mapping, surveying in rivers, watersheds and estuaries, including use of a total station laser theodolite. Has conducted hydraulic and hydrologic analyses using HEC-2 and HEC-1 computer simulation programs for flood control studies.
Susan Swift Section: Visual Quality	Environmental Planner; B.A. in Environmental Psychology; post-graduate courses in a range of environmental planning and analysis areas. Background in environmental design; has prepared visual analyses for new land development, mixed-use developments for urban settings, and large-scale institutional developments. Has prepared analyses of project impacts associated with land use, local plans and policies, and parks and recreation issues.
Rick Veronda Sections: Air Quality; Noise	Environmental Scientist, Air Quality/Noise Analyst; B.S. in Meteorology. Seven years of technical experience with noise monitoring and modeling, including monitoring along streets, highways, wilderness areas, cogeneration plants, university campuses, and adjacent to military flight routes. Has modeled point, line, and area air quality sources for highway, residential, industrial, commercial, and utility projects, has experience with air pollutant and

Name/Section(s)	**Background**
	meteorological monitoring. Has developed hundreds of FORTRAN programs, LOTUS worksheets, and DOS batch files for the data processing noise parameters, calculation of noise emission levels, air quality parameters, and calculation of air emission factors and emissions.
Lawrence M. Wise, Jr. Section: Fish Resources	Subconsultant with Entrix; B.S. in Marine Biology and Limnology. Three years experience in the implementation of the Instream Flow Incremental Methodology (IFIM). Knowledgeable in all aspects of instream flow assessment, including study design, data collection and analysis, model calibration, interpretation of results, ad report production. Has trained several field crews to collect IFIM data. Served as task leader on several IFIM projects on rivers, including the Tule, Kern, and Kings Rivers in California.

8. CONSULTATION WITH OTHERS AND PUBLIC INVOLVEMENT

8. CONSULTATION WITH OTHERS AND PUBLIC INVOLVEMENT

In addition to those individuals identified in Chapter 7, List of Preparers, a number of government staff and public citizens have provided information on the issues addressed in this EIR/EIS. This section summarizes the means by which consultation and public involvement were achieved, and lists those individuals who have contributed or responded to some part of the EIR/EIS process.

Notice of Preparation/Notice of Intent/Initial Study

On November 4, 1991, the State Board of Mining and Geology released a Notice of Preparation, indicating that the Board would be the lead agency for the environmental analysis of Syar Industries' reclamation plans for the four County sites. The City of Healdsburg was identified as the lead agency for the Healdsburg Bendway. After the NOP had been released, the U.S. Corps of Engineers determined that an EIS would be required pursuant to NEPA. Consequently, an Notice of Intent was circulated. An Initial Study and Environmental Checklist were attached to the NOP and distributed to federal and state agencies and known interested parties. The NOP/NOI is reproduced in Appendix A of this EIR/EIS. Written responses to the NOP/NOI are found in Appendix B.

The following individuals and organizations responded in writing to the NOP/NOI.

Federal

John R. Norberg, Chief, Branch of Engineering and Economic Analysis, Bureau of Mines, Department of the Interior

Wayne S. White, Field Supervisor, Fish and Wildlife Service, Department of the Interior

State

Gary F. Adams, District CEQA Coordinator, Caltrans

Mark Delaplaine, Federal Consistency Supervisor, California Coastal Commission

Mary Griggs, Manager, Environmental Review Section, State Lands Commission

Brian Hunter, Regional Manager, Region 3, Department of Fish and Game

Leigh Jordan, Assistant Coordinator, California Archaeological Inventory

George Larson, Manager, Waste Generation Analysis and Environmental Assessment Branch, Planning and Assistance Division, California Integrated Waste Management Board

Luree Stetson, Assistant Director, Office of Governmental and Environmental Relations, Department of Conservation

Charles T. Vath, Jr., Environmental Specialist III, California Regional Water Quality Control Board, North Coast Region
Kenneth R. Williams, Deputy Attorney General, Department of Justice

Organizations and Individuals

F. Milton Brandt
John Beuttler, United Anglers of California
Robert R. Curry, Integrated Watershed Group, Consultants
Martin Griffin, Co-chair, Westside Road Wineries Russian River Task Force
Stan Griffin, Vice-Chairman, Trout Unlimited of California
Edward C. Gustely
Cephas and Laura Ramquist
Don Reining, President, Southern California Rock Products Association, Southern California Ready Mixed Concrete Association
Phillip W. and Melba L. Rice
Jack and Pamela Street
Scott W. Whitaker

Scoping Session

On December 17, 1991, a public meeting was held in Healdsburg. Approximately 60 people attended. After a presentation outlining the EIR/EIS process, the project description and major issues, public comments were taken on the scope and approach of the EIR/EIS. Those commenting included:

Dick Behrens
Joe Brandt
Ed Gastely
Myrna Gotick
Martin Griffin
Terry Harrison
Joel Helman
Robert Hopkins
Ron Kaiser
Randy King
Barclay Nalley
Glen Sirchuk
Stephen Wilkie

Preparation of the Draft EIR/EIS

Comments on the NOP/NOI were reviewed, and where applicable, incorporated into the EIR/EIS. In addition, various government agency staff and knowledgeable individuals were contacted for

information on particular sections. The persons contacted in preparation of the technical sections of this EIR/EIS were:

Talbot Bailey, Syar Industries
Malcolm Carpenter, Martin Carpenter Associates, Consultants to Syar Industries
Bill Cox, Biologist, California Department of Fish and Game
Cathy Crossett, Engineer, Division of Structures, Caltrans
Alan Falleri, Mendocino Planning Department
Robert Gaiser, Senior Planner, Planning Department, Sonoma County
Martin Griffin, Co-Chair, Westside Road Wineries Russian River Task Force
John Johnson, Engineer, Windsor Water District
Ralph Locke, Syar Industries
Bob Morrison, General Manager, Sonoma County Water Agency
Richard Nichols, Wesco
City of Healdsburg
Robert Robertson, Engineer, Public Works Department, City of Healdsburg
Jim Simons, Simons and Associates, Consultants to Syar Industries
Darryl Simons, Simons and Associates, Consultants to Syar Industries
David Spielberg, Orrick, Herrington and Sutcliff, Attorney for Syar Industries
James Syar, Syar Industries
D.K. Todd, Hydrogeologist, D.K. Todd and Associates
Paul Ward

Circulation of the Draft EIR/EIS

The Draft EIR/EIS will be circulated for 60 days, with a public hearing to receive testimony to be held during the comment period. The distribution list appears at the end of this chapter.

Final EIR/EIS

Upon the close of the public comment period, the EIR/EIS authors will respond to all comments made in writing or during the public hearing. The Final EIR/EIS, which will include the comments and responses, will be published prior to certification of the EIR/EIS. The Draft and Final EIR/EISs will make up the complete EIR/EIS.

Syar Draft EIR Distribution List

Federal Agencies

Jim Bybee, Northern Area Environmental Coordinator,
National Marine Fisheries Service
Lars Forman, U.S. Army Corps of Engineers, San Francisco District
Kenneth Kinidy, U.S. Army Corps of Engineers, Norfolk District
Wayne White, U.S. Fish and Wildlife Service, Division of Ecological Service
Special Programs, Center for Environmental Health, Centers for Disease Control
Executive Director, Advisory Council on Historic Preservation
Department of Energy, Division of NEPA Affairs
Regional Environmental Officers, Department of Housing and Urban Development
Director, Office of Environmental Project Review, Department of the Interior
Defense Technical Information Center
Regional Administrator, Environmental Protection Agency, Region 9
Federal Emergency Management Administration
Regional Administrator, Region 9, Federal Highway Administration
Director, Office of Ecology and Conservation, National Oceanic and Atmosphereic Admin.
Commander, Twelfth Coast Guard District
U.S. Environmental Protection Agency, Officer of Federal Activities
Regional Forester, Region 5, U.S. Forest Service

State Agencies

Mark Delaplaine, California Coasta Commission
James Frey, State Lands Commission
Jim Pompy, Office of Mined Land Reclamation
Kenneth Williams, Department of Justice, Office of the Attorney General
Office of Planning and Research
State Conservationist, Soil Conservation Service
Director, State Agriculture Stabilization and Conservation Service

City and County Offices

Robert Gaiser, Sonoma County Department of Planning
City of Healdsburg
Healdsburg Regional Library
Sonoma County Library, Santa Rosa

Individuals and Organizations

Susan Brandt-Hawley
Karen Gafney, Circuit Rider Productions
John Geddie

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Susan Brandt-Hawley
Karen Gafney, Circuit Rider Productions
John Geddie
Martin Griffin, Russian River Task Force
Stan Griffin, Trout Unlimited of California
Edward Gusteley
Jerry Haag, Urban Planner
Rick Hanson, EIP Associates
The Healdsburg Tribune
Robert Hopkins
Laurel Marcus, State Coastal Conservancy
Kevin O'Day
David Spielberg, Orrick, Herrington & Sutcliffe
Mitchell Swanson, Mitchell Swanson & Associates
James M. Syar, Syar Industries, Inc.

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10. BIBLIOGRAPHY

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